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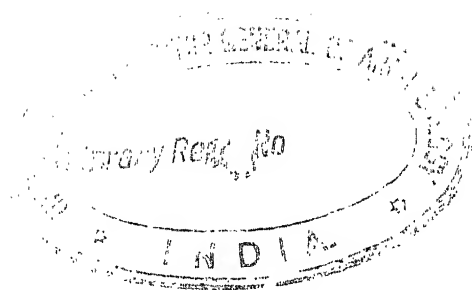
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PROCEEDINGS

OF THE

ROYAL GEOGRAPHICAL SOCIETY.



25274

VOL. XI.

SESSION 1866-7.

Nos. I. to VI.

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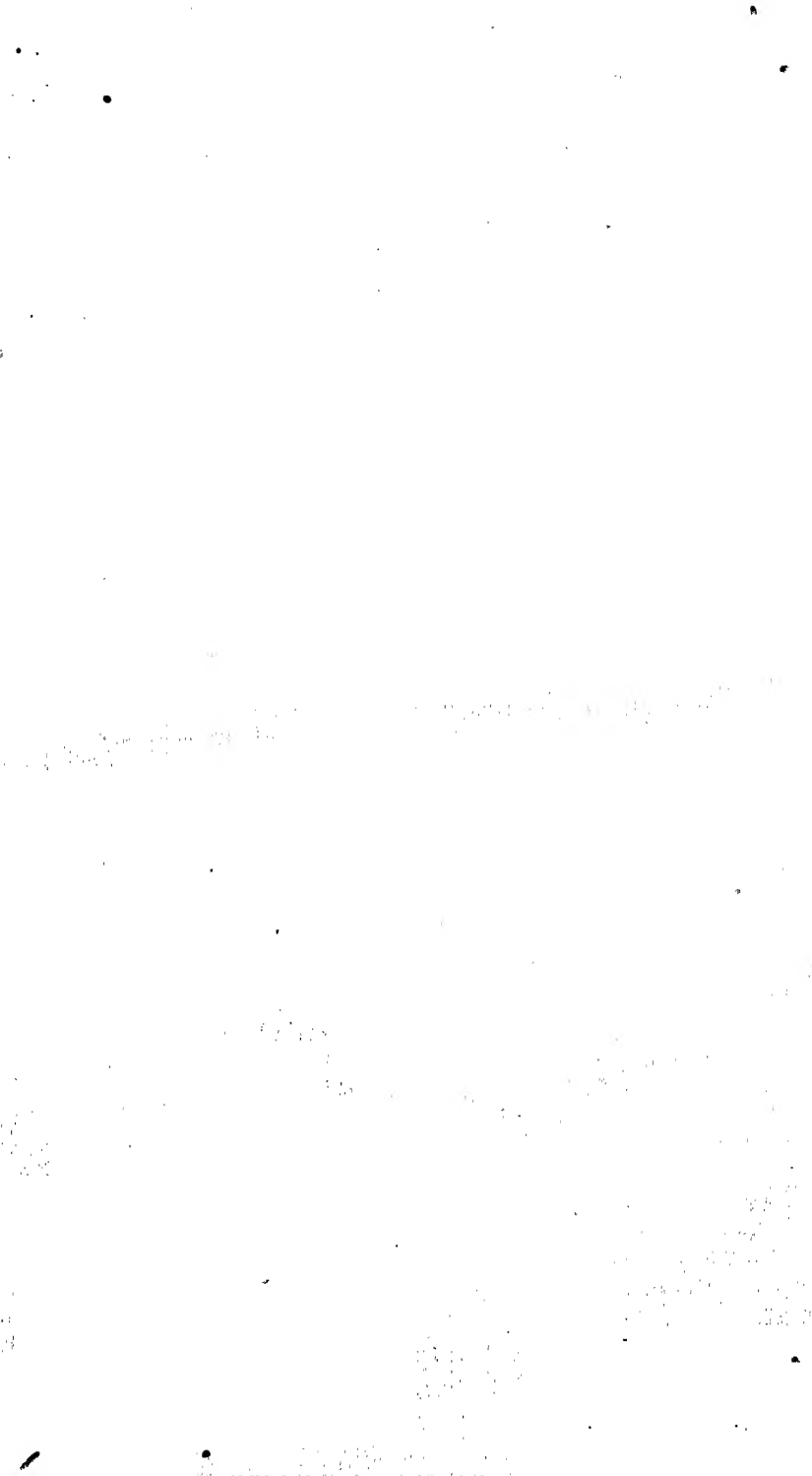
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PROCEEDINGS
OF
THE ROYAL GEOGRAPHICAL SOCIETY.

[ISSUED FEBRUARY 11TH, 1867.]

SESSION 1866-7.

First Meeting, 12th November, 1866.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in
the Chair.

PRESENTATION.—*R. B. Byass, Esq.*

ELECTIONS.—*Anthony Maw Bower, Esq.; William Charles Luard, Esq.; Major J. J. Macdonell (71st Regt.); Herbert Henry Morris, Esq., B.A.*

ACCESSIONS TO THE LIBRARY SINCE THE LAST MEETING, JULY 9TH, 1866.—*Donations*: 'Diary of a Journey Across Arabia, from El Khatif in the Persian Gulf to Gambo in the Red Sea,' by P. Byan, Esq. 'Die Völker des österlichen Asiens,' by Dr. A. Bastian. 'Mémoire sur l'Ethnographie de la Perse,' by M. N. de Khanikof. 'Abstract of the Adventures of Ladislaus Magyar in South Africa,' by Dr. Rónay. 'Report on the Headwaters of the River Waitaki,' by Dr. J. Haast. 'A Manual of Surveying for India,' by Capt. Smythe and Col. Thuillier. 'Report on the Chinchona Cultivation in India,' by C. R. Markham, Esq., F.R.A.S., &c. 'On the Budgets and Accounts of England and France,' by Major-Gen. G. Balfour, C.B., R.A., &c. 'Reisen durch Süd-Amerika,' vol. i., by J. J. von Tschudi. 'Les Portes-canaux. Sul moto ondosio del Mare,' by A. Cialdi. 'Charbon de Terre en Russie,' by von Helmersen. 'Reliquiæ Aquitanæ,' by E. L. and S. Christy. All presented by the Authors. 'Reports on the Trade at the Ports in China, open by Treaty to Foreign Trade, for 1865 and 1866,' presented by J. H. Fitzroy, Esq. 'Relation de plusieurs Voyages à la Côte de l'Afrique,' presented by S. M. Drach, Esq. 'Calanderio y guia de

forasteros de la Republica Peruana,' 3 vols.; presented by W. Bol-laert, Esq.

Purchased.—'Grönland geographisk og statistik beskrevet,' by M. H. Rink. 'De danske Handelsgestricter in Nord-Grönland,' 2 vols., by M. H. Rink. 'Annales de la Propagation de la Foi,' 23 vols. 'A Voyage Round the world in H.M.S. *Pandora*,' by Capt. Edwards. 'China Opened,' 2 vols., by Rev. C. Gutzlaff. 'Lettera rarissima di C. Colombo,' by A. B. Morelli. 'Voyages en diverses parties de l'Europe, de l'Afrique, et de l'Amerique,' 2 vols. 'Primera parte de los comentarios reales, que tratan de el origen de los Incas,' &c., 4 vols., by Garcilasso de la Vega. 'Historia Antipodum; oder Neue Welt,' von Johann L. Gottfried. 'A Description of the Persian Monarchy, now being the Oriental Indies,' by Thos. Herbert. Swinburn's 'Travels in the Two Sicilies.' 'Correspondence respecting the British Captives in Abyssinia' (Blue Book). Baker's 'Albert Nyanza' (2nd copy). 'De Aanmerkenswaardigste en Alomberoemde Zee- en Landreizen der Portugeezen, &c., in Oost- en Westindien,' 8 vols. 'Travels in Russia, the Krimea, the Caucasus, and Georgia,' 2 vols., by Robert Lyell, M.D., &c. 'Recueil de divers Voyages fait en Afrique et en Amerique.' 'Travels and Voyages through Europe, Asia, and Africa,' by Wm. Lithgow. 'Recherches sur les Voyages et Decouvertes des Navigateurs Normands en Afrique,' &c., par L. Estaucelin. 'Dissertazione intorno ad alcuni viaggiatori eruditi Veneziani,' &c., da Don J. Morelli. All added to the Library by purchase. Continuations of Journals, Transactions, &c.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST ANNIVERSARY, MAY 28TH, 1866.—A Map of the Kirghiz Steppe and Regions of the Orenburg, and Siberian Kirghizes, from a Russian Map. A Map of the Pearl-banks of Tnticorin and Trichendoor, by C. R. Markham, Esq. A Map of Bohemia, showing the Scene of the late Battles; copied by the photo-zincographic process from the Austrian Map. A Map of British Burmah, showing routes from Maulmain to the Shan States, by W. Montgomerie, Esq. A Map of the Survey of the Province of Pegu, by Lieut. E. C. Williams. A Map of the Province of Martaban from Martaban to Tounnggoo, by A. Hobday. An Outline Map, showing the Boundary of the British and Siamese Territories of the Malay Peninsula. A Map of Moravia; on 4 sheets; copied by the photo-zincographic process from the Austrian Government Map, at the Ordnance Survey Office. Two Maps of the Vicinities of Vienna, Presburg, and Feldsburg; copied from the Austrian Government Map, at the Ordnance Survey Office. A Geo-

logical Map of the Department of the Seine; on 4 sheets; by M. Delesse. A Map of the Chain of Monte Rosa; photographed from the Carte Federale of Switzerland, by A. A. Reilly. A Map of the Lower Course of the Jordan and of the Dead Sea, by Lieut. Vignes. A Map of the Wady Arabah and of the Bed of the Wady el Jeib, by Lieut. Vignes. A Geological Map of Saxony and Magdeburg; on 4 sheets; by J. Ewald. 4 Sheets of a Geological Map of Rhenish Prussia. A Map of the Gold Region of the Frazer River, &c., by J. Wyld. A Map of the Province of Valdivia, by Bernardo E. Philippi. A Map of part of the Province of Tarapaca, from Port Conajagua to Ojaica. A Plan of the City and Port of Valparaiso. A Plan of the City of Lima. General Atlas of the World; on 30 sheets; by Dr. Henry Lange. Chromo-lithographic Atlas of Saxony; on 12 sheets; by Dr. Henry Lange. A School-Atlas of Saxony; on 8 sheets; by Dr. Henry Lange. The Bust of the President, Sir R. I. Murchison, Bart., K.C.B., by Amelia R. Hill. A Map of the Mekran Coast from Kurrachee to Guadur, showing the Route of Lieut. Ross. A Map of the Route of Lieut.-Col. Goldsmid and Major Smith from Ispahan to Choubar and Bunder Abbas. A Map of the Neilgherri and Koondah Hills, &c. A new Map of Railways and other Improvements of London. Stanford's Library Map of Africa, by A. K. Johnston. A Plan of the Kaimenies or Burnt Islands in the Crater of Santorin Island, showing the effects of the late Volcanic eruptions, by Capt. Lindesay Brine, R.N. A Chart showing the Temperature of the Currents off the Cape of Good Hope, by H. Toynbee, Esq. A Photograph of H.M.S. *Bombay*, destroyed by fire off Monte Video. A Chart of the Nicobar Islands, by Commodore B. v. Wüllerstorff-Urbair. A Map of the Punjab; on 8 sheets; by Lieut.-Col. D. R. Robinson, R.E. Chinese Map of the Inner City of Pekin; presented by H. Kopsch and E. Taintor, Esq. Black's New Map of England and Wales, by J. Bartholomew; on 16 sheets. Ordnance Survey, 883 sheets. Admiralty Charts, 37 sheets.

The PRESIDENT opened the Session with the following Address:—

GENTLEMEN,—Although I feel assured that the Session now opened will be productive of highly interesting results, particularly in respect to explorations in Asia and South America, I cannot lead you to hope for any such important discovery in Africa as that with which Sir Samuel Baker delighted us in the past year; nor can we be excited as we were upon Du Chaillu's return after his last effort to penetrate into Equatorial Africa. Until the grand problem of what is the true watershed of the vast unexplored region far to the south

of the huge water-basins which feed the Nile, the Victoria Nyanza of Speke and Grant, and the Albert Nyanza of Baker, which we earnestly and hopefully look for at the hands of Livingstone, we cannot expect to be gratified as we were when the narratives of those distinguished explorers were brought before us. In the mean time, however, I rejoice to be able to inform you that, by the last accounts received, the indefatigable and undaunted Livingstone was steadily advancing beyond the Rovuma River towards the interior, that he was in good health and spirits, and fully hopeful of success in defining the northern boundary of his own Lake Nyassa, and ascertaining whether it receives a water-supply from the north. Let us trust that, if he reaches the Lake Tanganyika of Burton and Speke, he may be enabled to determine whether it really lies in the great depression assigned to it by those travellers; and, if not, whether it has any issue to the North, so as to be, as it were, the ultimate southern feeder of the Nile (a theory of some geographers), or is there closed in by lofty mountains.

Turning to the consideration of a topic which deeply interests us, the fate of the few survivors of the wreck of the *St. Abbs*, East Indian-man, on the Somauli coast, north of Zanzibar, I would not make any statement which might too much encourage the hopes of those who have mourned the loss of relatives and friends; but I am happy to inform you that Lord Stanley, the Secretary of State for Foreign Affairs, has transmitted to me a copy of a despatch from Captain Pasley, R.N., commanding the *Highflyer*, by which it appears that a report still prevails of a white man, or of white men, having been seen at some days' march distant from the coast; and that an emissary has been sent inland with a promise of a reward of 100*l.* for every white person who may be rescued.

I cannot as yet enumerate the titles of many of the memoirs and narratives which will be brought before you in the course of the Session; but among those which have already been received, I strongly commend to your attention the paper which is to be read this evening, and which gives an account of the journey performed by Mr. W. H. Johnson, from Leh, in Little Tibet, to Khotan in Chinese Tartary, thus carrying his explorations far beyond the North-Western boundary of Western India. This important Paper has already elicited the unqualified approbation of Sir Henry Rawlinson, Lord Strangford, and Sir Andrew Scott Waugh. In alluding to this communication, I beg to direct your attention to the large new wall-map of Asia, which has been made during the recess, and a portion of which is now before you. This large map will doubtless render the reading of every paper on any part of Asia much more

intelligible to those who attend our meetings. We are all much indebted to Admiral Sir G. Back, Admiral Collinson, and General Balfour, under whose direction this grand diagram has been prepared.

In reference to South America, you will be glad to learn, that Mr. W. Chandless, the explorer of the Purús River, to whom the Victoria Gold Medal was given at our last anniversary, has returned safely to England, after completing his self-imposed task by a second journey up the river, and a survey of its most important southern affluent, the Aquiry. The memoir which this distinguished traveller has prepared on the subject of this last journey will probably be read by himself before you in the course of the session.

Another important paper, on the Province of Carabaya, in Southern Peru, has been presented to the Society by our Honorary Corresponding Member, Don Antonio Raimondy, who has spent three years in exploring the region. The paper contains much new information about the river-systems of the district through which flows the Madre de Dios; and we may hope now to have a final solution of the difficulty which geographers have felt in connecting these streams with the rivers which flow into the Amazons.

Notwithstanding the want of success which our Council met with last year in their earnest endeavour to induce the Board of Admiralty to send out a scientific expedition to the North Pole, you will be glad to hear that we are now emboldened to make another effort, inasmuch as that powerful national body, the British Association for the Advancement of Science, has appointed a committee, of which I am the chairman, to urge upon Her Majesty's present Government the desirableness of carrying out a measure fraught with such interest to all geographers and naturalists. In such capacity, then, as well as in that of your President, it will be my duty to persevere in the endeavour to realise a North Pole survey, for the accomplishment of which the men of science of other countries look to England and her experienced and undaunted Arctic seamen, who are most eager thus to complete their examination of those regions in which they have already won so much distinction.

Touching Australia, the only event of importance which has transpired since we last met is, I regret to say, of a very sorrowful nature. The Leichhardt Search Expedition, to promote which the Society contributed 200*l.*, had crossed the continent from Victoria to the head of the Gulf of Carpentaria, when its experienced and enterprising leader, Mr. Duncan McIntyre, was struck down by an endemic fever, and died after a few days' illness. This sad

event will not, however, put an end to the search, as a successor has been appointed in the person of Mr. Campbell.

In concluding these brief observations, I beg to congratulate you on the completion and erection of an obelisk to the memory of that great and successful discoverer, the lamented Speke. Out off, alas! as he was before he received those honours to which, with his companion Grant, he was so justly entitled, it is gratifying to know that his numerous friends and admirers have been enabled, by the Queen's special permission, to place this memorial in one of the avenues near the broad walk of Kensington Gardens. I invite you to inspect this obelisk, which, like that also erected by our private subscriptions to commemorate the noble daring of the French Lieutenant Bellot, who was lost in the search after Franklin, does great credit to Macdonald and Field, the well-known granite-workers of Aberdeen.

This mention of the name of the renowned Arctic navigator, to whom I was so deeply attached, and to whom I wished "God speed" when he left our shores for the last time, in 1845, prompts me to announce to you that the uncovering of the fine statue, by Mr. Noble, which was unanimously decreed to his memory by a vote of Parliament, will take place on Thursday next, at half-past two o'clock.

When I inform you that Sir John Pakington, as First Lord of the Admiralty, has most willingly assented to the request to attend, made to him by myself, in the name of all geographers, and particularly in that of the many gallant Arctic naval officers and explorers who are Fellows of this Society, I feel certain that you will desire to congregate around the monument on this touching occasion, and thus cheer up Lady Franklin by a fresh proof of your high estimation of the great deeds of her illustrious husband.

The Paper of the evening was the following:—

1. *On the Recent Journey of Mr. W. H. Johnson from Leh, in Ladakh, to Nchi in Chinese Turkistan.* By Major-General Sir H. C. RAWLINSON, K.C.B., M.P., &c.

SIR HENRY C. RAWLINSON said the journey of Mr. Johnson was a most remarkable one, not only for the boldness with which it was undertaken into an almost unknown country, many hundred miles distant from the British frontier, but for the scientific precision with which the places traversed were made known to us, and without which exploration in unknown countries lost half its value. Mr. Johnson was born and bred in India, and, having received his

education at a school in one of the hill-stations, was very early engaged on the Great Trigonometrical Survey, and instructed by Sir Andrew Scott Waugh and other officers of the Survey. In that position he showed so much ability that he was afterwards intrusted with the direction of various subsidiary works. It was whilst carrying out one of these operations, on the extreme northern limits of the territory of the Maharajah of Kashmir, that he was enabled, at the invitation of the Khan of Khotan, to perform the remarkable geographical exploit now under consideration. The territory up to the mountains which limit Turkistan on the south, belongs to the Maharajah of Kashmir; that is, to the Hindoo chief of Jummoo, the son of the famous Gholab Sing, to whom, at the conclusion of the Punjab war, we granted Kashmir and its dependencies. The inhabitants of Tibet are Buddhists; those of Kashmir are principally Mahomedans; whilst the people of Chinese Turkistan are Turks of an old stock, speaking the Jaghatai Turkish to the present day: they are Mahomedans of a somewhat bigoted character, but intelligent and rather good specimens of the Turkish race. The city of Ilchi or Khotan had been visited by no Europeans except Marco Polo, Benedict Goetz, and a few Jesuit missionaries in the last century, who were attached to an expedition sent by the Emperor of China to subdue the Eleuths of Zungaria. Chinese Turkistan is generally called "the Province of the Six Cities," from the six great marts which it contains; namely, Kashgar, Yarkand, Aksu, Yenghi-sheher, Ilchi, and Oosh-Turfan. Ilchi is important as being on the line of one of the great commercial routes between Russia and India. For a long time there has been an active commerce between the Russian frontier and India; that is, from the great Russian mart of Semipalatinsk, by a road which comes down through Aksu to Yarkand and so on to Kashmir. And this route crosses the trade road from Persia and Bokhara to China, *via* Kashgar and Yarkand. So that although Ilchi would lie on the straight road between Russia and India, the route by Yarkand has been usually found more convenient, the excess in actual distance being compensated for by all the routes converging on that point. This would explain how it is that the city of Ilchi has remained up to the present time so little known and so very rarely visited. Recent travellers between Russia and India had indeed passed in its vicinity, but no one had actually reached the city in question in the present century but Mr. Johnson. Dr. Thomson was the first British traveller who had crested the Karakorum. The brothers Schlagintweit had afterwards advanced from the Karakorum as far as Pushia, a hundred miles to the south of

Ilchi, but did not reach the city. It was necessary to make this remark, as it had been asserted on the Continent that they had really anticipated Mr. Johnson in the discovery (as it might be termed) of Khotan. For this feat, indeed, the Schlagintweits had received from the Russian Emperor the honorary title of Sakunlunski, that is, "he who has penetrated beyond the Kuen-lun." But, if they really merited that title, Mr. Johnson ought to receive the superior titular distinction of "Sailchiski," because he had penetrated not only beyond the Kuen-lun, but beyond Ilchi, a much more creditable and difficult task. In ancient times Ilchi was the high place of the Buddhist religion in Central Asia; in the fourth century, indeed, the famous Chinese pilgrims found fourteen convents in the city, each of them containing 3000 devotees. In its vicinity, too, there was said to stand one of those magnificent Buddhist temples which excited so much wonder in those days, an edifice which was traditionally believed to have taken eighty years in building. It was a rich and wonderful place for objects of art, and celebrated as a sanctuary throughout the whole of Central Asia. All that had passed away, and the neighbourhood was now almost a desert. Till within the last few years the country had been in the possession of the Chinese; but, owing to the shock which that empire had received through the war with England, the whole of these Turkistan states had risen in rebellion, and thrown off the Chinese yoke. The neighbouring city of Yarkand is at present in a state of anarchy, and Mr. Johnson gave an amusing account of the offer which the principal inhabitants had made to him whilst at Ilchi to take possession of the place on behalf of the English. A large inroad of people had taken place from the Jaxartes and Khokan, driven thence by the advance of the Russians: these refugees had pressed eastwards and had occupied both Kashgar and Yarkand; recently indeed they had also endeavoured to possess themselves of Khotan. The consequence was that the whole country was in a state of anarchy and confusion, and it was impossible to say what would be its fate. This state of things had produced a favourable opportunity for opening up relations, especially commercial relations, with these Turkistan states; the supplies which they used to receive from China having been cut off, and the Khan of Khotan, who had formerly travelled through India and become an admirer of British rule, having shown himself most anxious to cultivate trade with us.

Mr. Johnson gives the following description of the Khan:—

"The Khan Badshah, of Khotan, is about eighty years of age, of good stature and appearance, and about six feet in height; rather stout, but well built, and of very fair complexion. He is seen to great advantage when dressed in his robes of state, which consist of a choga of silk, worked over with gold-thread,

and a large white turban, tied after the Mogul style. He is reported to be very ill-tempered and very strict in his government. I must, however, admit that he showed me much kindness while in his country, and kept all his promises, with the exception of not allowing me to leave the place after a stay of four days, as had been agreed upon; and in wishing to keep me a longer time, which he would have done, had I not pointed out to him the uselessness of his doing so. He wished to detain me as an hostage, until such time as the British Government sent him assistance, in the shape of troops and arms, against the Khokanees or Andajanees and the Russian forces, which latter are daily approaching towards Yarkand and Khotan. On his return from Mecca, through India, in 1863, he was made the chief Kazi of Ilchi, and within a month he succeeded in raising a rebellion against the Chinese, which resulted in their massacre, and his election by the inhabitants of the country to be their Khan Badshah or chief ruler. The province of Khotan was the first in which the Chinese were destroyed, and the example was followed in Yarkand, Aksu, and other cities."

The difficulty of communication between India and Central Asia had hitherto been not merely physical, but political; and a great obstacle still exists in the right maintained by the Maharajah of Kashmir, whose territory lies to the south, and includes the mountain-passes into Turkestan, of levying transit duties: these, indeed, are so high that they almost paralyse commerce. Mr. Johnson, however, describes a road, practicable for wheeled carriages throughout the year, which passes from Ilchi into India, to the east of the Maharajah's dominions. If this information prove true, it will be one of the most valuable results of Mr. Johnson's expedition. The road is called the Polu road, and passing to the east of the Kuen-lun chain, turns through Rudok, towards the south. Mr. Johnson's words are:—

"The usual route from Leh to Ilchi is over the Karakorum Pass and through Sanju; but there are several others which, however, have not been much used till very lately. These are, the Hindotash diwan, the Brinjga diwan, and the Polu route. The last of these is the best, as it lies over vast plains where water, grass, and wood are obtainable at every halting-place. It is reported that wheeled conveyances may be taken from the Changshenno Valley and Rudok to Ilchi and Yarkand by it; the only difficulty which exists is, that a portion of the route passes across the Chang-thang plain, which is occupied by shepherds, from Rudok, who closed the road last year to travellers proceeding from Leh and Ilchi. . . . This route though circuitous has many advantages over the others, the chief of which are, that wood, grass, and water are obtainable at every stage; that the road passes over no rugged and high snowy ranges, like the Sarsil and Karakorum passes, that it is safe from robbers; that it leads not only to Ilchi and Yarkand, but also, *via* Lob, to the large and important city of Karakashar, situated about 300 miles north-east of Ilchi, and which, with numerous other places of note, are occupied entirely by Kilmak Tartars. . . . on the high road from Kashgar and Ili to Pekin. By this route is also valued Usturfani shawl-wool (superior to the Changthang) which is produced from the goat found in the Aktag or Thian Shan range of mountains, and a variety of other merchandize, may be brought down in large quantities for the Punjab and English markets. At the present time there is

an excellent opening for exports from India, because all trade between China and the Mahommedan States of Central Asia is at a complete standstill."

Mr. Johnson's route on his journey from Leh, whence he started in July, 1865, was by Tikse and Tañksi to the Pangong lake, thence over the Masimik Pass (18,990 feet) to the valley of Changchenmo; northward from this over the Lumkang Pass (19,533 feet) into the elevated plateau which extends hence to the Kuen-lun range; the first plain of the plateau being 17,300 feet above the sea-level, and containing large lakes, one of them 60 square miles in extent, and the second plain sloping for 30 miles in a north-easterly direction from 16,700 to 15,300 feet. At the northern end of these, he arrived on the banks of the Karakash River of Turkistan, at a point 15,500 feet above the sea-level. From this place to Ilchi occupied sixteen days' march, at the commencement of which he crossed the Khatai diwan (17,501 feet) and Yangi diwan (19,092 feet) Passes of the Kuen-lun, and descended to Brinja. The positions of all these places, as well as of Ilchi and Kiria, were fixed by observations, and a map constructed in India, from Mr. Johnson's plane-table. The altitude of Ilchi was found to be 4329 feet; the latitude $37^{\circ} 8' N.$, and the longitude $79^{\circ} 25' E.$

Mr. Johnson remained in Ilchi sixteen days; returned to Kashmir by the Karakorum route, by way of Zilgia, Sanju ($37^{\circ} 3' 57'' N.$ lat., and $78^{\circ} 29' 30'' E.$ long.), the Sanju diwan Pass (16,763 feet), Shadula ($36^{\circ} 6' 15'' N.$ lat., and $78^{\circ} 29' 30'' E.$ long.), the Karakorum Pass (18,317 feet), Yapshan and Khardong to Leh, reaching the latter place on the 1st of December, 1865.

Sir Henry concluded by saying he was sorry to see, by the Indian papers, that this communication of Mr. Johnson with the Khan of Khotan has been rather rebuked by the Government. Of course, he had no authority to enter into any political relations, but being in the place, he could hardly avoid receiving such communications when they were addressed to him. He had not committed the Government in any way. All that we should do at present with reference to Khotan, or to any of the potentates in Chinese Tartary, would be to cultivate friendly relations for the purposes of trade. He thought all must be prepared to admire, not only Mr. Johnson's great intrepidity in venturing alone on such a journey, but also his address in getting away from Khotan, which was a much more difficult matter than getting there. We were further indebted to him for having availed himself of every opportunity which offered for improving our geographical knowledge of the country, by obtaining observations wherever he could; and where he could not obtain observations, by keeping his plane-table, at any rate, with

such accuracy as to enable our geographers, on his return to the provinces, to fill in the whole of the mountain country, and to connect this important position of Ilchi with the great Trigonometrical Survey of India. There were many other matters connected with the subject that he could speak upon, if it were desired. He especially alluded to the political questions connected with Central Asia. If there was any wish to hear what his views were on the politics of Central Asia, he should be happy to communicate them in a few words; but he would not venture to volunteer them, as the subject was not immediately connected with the objects and duties of the Geographical Society.

Mr. Johnson's Paper and Map will be published in the 'Journal,' vol. xxxvii.

The PRESIDENT said that, long as he had presided over the Society, he had never heard a paper which more completely developed the character of a true, bold, and scientific manager of an expedition than this paper of Mr. Johnson. He thought, too, that without the admirable commentary of Sir Henry Rawlinson, most of those present would have been lost in an unknown world; and he, therefore, would connect the name of Sir Henry Rawlinson with that of Mr. Johnson, in asking them to return their thanks for this communication. It was now his duty to call upon gentlemen to offer some observations, even in opposition, if that were possible. Lord Strangford had long resided in Constantinople, and had made himself acquainted with those countries, and certainly no man in the room was better qualified to be the first to rise and speak upon such an occasion.

LORD STRANGFORD said, instead of opposing Sir Henry Rawlinson, as the President had invited gentlemen to do, he was rather in the position of Oliver Twist—disposed to ask for more; and, as Sir Henry Rawlinson had promised more on the subject of politics, it would ill become him to say anything upon that point. With regard to the paper, he did not hesitate to say that it was one of the most important papers that had ever been read before the Society. Our previous knowledge of the country had been in outline; but this was a filling-in of the picture, and the commentary of Sir Henry Rawlinson was the frame in which the picture was set. The bare facts communicated in the paper were most striking. The political fact was neither more nor less than the complete break-up of the Chinese empire, as regards its external dominions. Concerning that country, we were slaves to the map-maker's conventionality of a "Mongolia." Now, there was no Mongolia; the Mongols, from whom the comprehensive term was derived, were merely a nomadic population, wandering over a single portion of the so-called country. The settled and cultivated part of it was the Turkish part, which lies along the rivers that converge from the interior faces of the inclosing ranges. All that country which forms Chinese Turkistan is said to have cast off the Chinese yoke and to be entirely free, and, more than that, to be eagerly anxious to enter into commercial relations with the rest of the world. More particularly is this the case with the chief of Khotan, who has travelled through India, and who only wants to put an end to the monopoly of the Maharajah of Kashmir in order to enter into commercial relations with India by this important carriage-road that had been described. Those two facts—the political fact and the commercial fact—were in themselves sufficient to constitute this paper one of the highest importance. Sir Roderick Murchison had alluded to his having

resided at Constantinople, and having a '---'---'---' East. The only observation he could make upon that was, '---'---'---' at Constantinople, who has any '---'---'---' Turkish language, has only to walk down the main street '---'---'---', and converse with the wild Tartars whom he will meet there gathered from all parts of Central Asia, to realise to himself the extent to which these countries are thoroughly and essentially Turkish. He will comprehend in a living way that from Constantinople to Yarkand in one direction, and from Constantinople to Tobolsk in another, the Turkish language is spoken in every town and village. There is no common political or literary union, but the fact shows the enormous spread of the Turkish race by conquest, and it is a fact which cannot fail to be realised by any one at Constantinople. With regard to the geographical part of the question, the problem of Central Asia was, Where did Tibet end to the north? and what became of the Kuen-lun range of mountains ultimately? We had no European knowledge beyond what we had heard from the Jesuit missionaries. In the work of Abbé Huc there was not a geographical fact from beginning to end; Mr. Bryan Hodgson, who had read a paper before the Bengal Society, has given the names of the stations and the number of the passes between Nepal and Peking, from the itineraries of the tribute-bearing embassies; but beyond that there was absolutely nothing at all. With regard to the Revolution, he wanted to call attention to this circumstance, that there seemed to be a regular Mohammedan movement in progress everywhere in Central Asia. As far as he could make out, the Tungais, who are most probably of the Chinese race but of the Mohammedan religion, seemed to have all the fervour and "go" of the early Mohammedans; and it really looked as if the future of Chinese Proper were in their hands. Sir Henry Rawlinson mentioned that Mr. Johnson had met with a rebuke. He could not understand this. Mr. Johnson had achieved an extraordinary geographical feat, one of the greatest value that it was possible to conceive; and he could not understand how it was that Mr. Johnson should meet with rebuke. He did not understand why, instead of discouraging them, the Indian Government did not encourage its subordinates to visit those countries where there was now no difficulty in Englishmen going; and he would appeal to the Geographical Society whether, if we persistently neglected the present opportunity of going into a country thus thrown open to us, it would not be most unpardonable remissness on our part.

Mr. J. CRAWFURD having also eulogised Mr. Johnson's paper, said he did not think so much of the Turks as Lord Strangford did. Like all other Asiatics, they are capable of advancing to a certain point, and there they stood still. As warriors, and sometimes as governors, they had been very successful. They conquered the Greek empire, and they conquered India. But what else had they done in India or in Europe? In India they had not the skill to propagate their own language; they gave way to a people who invaded India in a much smaller degree—the Persians, and even adopted the Persian language, dropping their own. With respect to the great trade that was expected to spring up, the country, though a large one in extent, is a very poor one in point of fertility. He wanted to know what the Turks had to give us? He should like to submit a sample of their cotton to a Liverpool broker. But what had they got besides cotton? They seemed to have a great deal of gold, which he would advise them to get rid of as fast as possible. He hoped Sir Henry Rawlinson would name a few of their productions.

Mr. TRELAWNEY SAUNDERS said, in addition to the obstacle presented by Kashmir to the development of any communication with the countries to the northward of India, we have had difficulties distinctly interposed by the Chinese Government upon our own frontier, especially in the direction of the great road opened up to Shipki, on our frontier. He should like to know

whether any steps had been taken to remove those obstacles? And with regard to the insurrection which has broken out in the cities that form the western portion of the Chinese province of Ili, divided into the northern and southern circuits of the Celestial Mountains, he should like to know if that insurrection has extended to the other six cities which lie to the eastward, four of which formed a portion of one of the eighteen provinces of China? As to the productions of the countries described by Mr. Johnson, they constitute the largest pastoral region on the face of the earth; and he believed, if we could only secure free communication, there would be no difficulty in bringing down into India such an outpouring of wool as would speedily affect our Australian markets. He must ask that the next time an expedition was got up for the purpose of penetrating across the Himalayas that it would not meet with official rebuke. We wanted to develop friendly intercourse with these warlike and pastoral peoples of Central Asia, and to encourage trade with them. He hoped the President and the Society would encourage, and not discourage, expeditions of this kind.

It was said Mr. Saunders might be quite sure that the President of the Geographical Society would never discourage, but on every occasion encourage such explorations.

Sir HENRY RAWLINSON observed that the list of products given by Mr. Johnson was not very remarkable in a commercial point of view, because very few of them would be fitted for export. He says "the whole country, especially the Kuen-Lun range of mountains, is wealthy in minerals, viz., gold, silver, iron, lead, copper, antimony, salt, saltpetre, soda, and coal; of this last I have samples. It is found near the village of Duá in Khotan, and to the west of Yarkand, on the road to Kashgar. Gold and precious stones are chiefly found in the beds of the streams which issue from the Kuen-Lun range, and in very large quantities about Karakulak, Kiria, and Chira. It is said that 3000 men are employed in the gold-fields. The ordinary value of gold in Khotan is 100 rupees per tola, while in Kashmir the same quantity sells for 17 to 18 rupees; this circumstance alone will show how abundant gold is, and how large a quantity there must be at the present time in the country." These are products of the country immediately around Khotan. In other parts of Turkistan, especially in the valleys of the Jaxartes and Zer-Afshan, cotton is the main article of produce, and it is supplied largely to Russia. In fact, the great object of the Russians recently has been to convert Khokan and Bokhara into a cotton-producing country exclusively, with the view of supplying the Russian manufacturers with the raw material, to be sent back worked up into textile fabrics suited to the wants of the country. But besides cotton, raw silk is produced in large quantities. The country also supplies a considerable number of horses, carpets, wool to any extent; and in the valley of the Jaxartes many spots are declared to be favourable to the cultivation of madder, indigo, rice, sugar, and opium. The metallic resources of the country are enormous; and from Khotan is procured entirely the supply of jade, which is so much valued in China. All these articles certainly entitled the country to some consideration as a producing country. With reference to what Mr. Saunders had said about the Chinese frontier, he wished to explain that the route from the Niti pass, by Shipki crossed only a small corner, from twenty to thirty miles, of prohibited territory. There had been negotiations about it, and he understood that the transit trade in future, from the end of the Hindostan road on to Ghartûp, would pass free over that portion of Chinese territory. At any rate, in the present disorganised state of Chinese Tartary, the Peking authorities were not in a position to keep up those restrictive regulations on the Indian frontier which had hitherto paralysed commerce; and he expected very shortly that there would be complete free-trade between India and Central Asia. The article which would pay now was tea. The Moham-

medans of that country could not live without tea; and owing to the present disturbed condition of affairs, the tea trade from China was entirely cut off. With regard to the state of Zungaria, our last accounts referred to the city of Kuldja. All the Mohammedan cities were, one after the other, throwing off fighting at Kuldja extended over two years. Kuldja of the country, and was situated just within the Chinese frontier to the eastward of the Balkash Lake. The war ended in the withdrawal of the Chinese, not only from Kuldja and the dependent cities, but from the whole province. And with regard to the lower cities of Khamil and Karashar, he believed the Chinese power to be so broken that it would have to withdraw completely to the Great Wall. It was very important, politically considered, that the country should be thus thrown open. He did not believe there ever could be the slightest danger of collision with Russia in this direction across Turkestan. With so many other lines open, no army would ever think of attempting to force a way, not only across those great barren plains of Turkistan, but across the enormous mountain-belt extending from Karakorum to the Punjab, where you have a succession of passes varying from 15,000 to 19,000 feet in height. It is the most impassable of any part of the north-western frontier of India; consequently, the most unlikely to be the scene of any collision between the two empires. He believed both nations might trade with perfect safety with the cities of Chinese Turkistan. The Russians have long had it so much at heart to open a trade with that country, that the principal commercial concession they demanded in concluding the treaty of Peking was the right to establish consuls and factories at three different points; at Kuldja, at Chuquchak, and at Kashgar. He confessed he should very much like to see English and Russian consuls established in those cities, for the mere purpose of trade, and without any political power. It would be for the benefit of the country itself, and for the benefit of the trade of the two European empires; also, it might tend to promote good feeling and honourable commercial emulation between them.

The PRESIDENT, in closing the meeting, said he entirely approved the concluding observations of Sir Henry Rawlinson, inasmuch as there could be no risk of war between Russia and ourselves in consequence of our exploring and trading with these countries.

Second Meeting, 26th November, 1866.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, IN
THE CHAIR.

ELECTIONS.—*James Burgess, Esq., M.R.A.S., &c.; Roderick W. Cameron, Esq.; Commr. Manuel Jennaro Carrillo (Peruvian Navy); William Chandless, Esq., M.A.; John Collinson, Esq., C.E.; J. Howarth Clark, Esq.; Lord Edward Clinton, M.P. (Capt. Rifle Brigade); Fitzwilliam Dick, Esq., M.P.; W. C. B. Eatwell, Esq., M.D. (Surg. H.M. Indian Army); Edward St. John Paviman, Esq., F.G.S.; William Felkin, Jun. Esq., F.Z.S.; Commr. Thomas B. Hanham, R.N., &c.; Patrick Henderson, Esq.; John Minett Hockley, Esq., R.N.; Henry Kopsch, Esq.; Henry Maudslay, Esq.; A. J. Mundella, Esq.; Frederick Peel, Esq.; Edwin Ransom, Esq.; Richard Proctor Sims, Esq., C.E., &c.; Rev. Dr. James Stewart; Edward*

C. Taintor, Esq.; John Thomson, Esq.; Robert Richard Torrens, Esq.; Francis Young, Esq.

ACCESSIONS TO THE LIBRARY SINCE THE LAST MEETING, NOV. 12TH, 1866.
—‘Recherches sur la Longitude de la Côte Orientale de l’Amérique de Sud,’ par M. E. Mouchez. ‘Report on the Bar and Navigation of the Douro,’ by Mr. Consul Crawford. ‘Eisenbahn- Post- und Dampfschiffs- Karte von Europa,’ von Dr. H. Lange. ‘Les Polynésiens et leurs Migrations,’ par M. de Quatrefages. All presented by the Authors. ‘L’Empire du Milieu,’ par M. le Marquis de Courcy. Added to the Library by purchase. ‘Guide du Baigneur et de l’Etranger à Aix-les-Bains.’ ‘Notice sur les Chamettes, et sur les Environs de Chambéry.’ ‘Relation d’un Voyage à Bruxelles et à Coblenz, 1791.’ All presented by S. M. Drach, Esq. Continuation of Journals, &c., &c., &c.

ACCESSIONS TO MAP-ROOM SINCE THE LAST MEETING.—Map of Asia Minor, by P. de Tchihatchef, during the years 1847 to 1863; compiled by Dr. Kiepert, and presented by Dr. Petermann. Map of the Central Province of Ceylon, exhibiting the Coffee-plantations, by J. Van Cuyhnturg, 1835; presented by C. R. Markham. Ordnance Maps, 1230 sheets, accompanied by 65 Area Books.

Previous to the Paper of the evening, the following letter from Dr. Livingstone was read:—

“Ngomano, 18th May, 1866.

“When we could not discover a path for camels through the mangrove-swamps of the mouth of the Rovuma, we proceeded about 25 miles to the north of that river, and at the bottom of Mikindany Bay entered a beautiful landlocked harbour called Kinday or Pemba. The entrance seems not more than 300 yards wide, and of these about 150 are deep; the reef on each side of the channel showing so plainly of a light colour that no ship ought to touch. The harbour is somewhat of the shape of the ‘spade’ on cards, the entrance being like the short handle. There is nearly a mile of space for anchorage, the southern part being from 10 to 14 fathoms, while the north-west portion is shallow and rocky. It is a first-rate harbour for Arab dhows, the land rising nearly all round from 200 to 300 feet. The water is so calm, Arabs can draw their craft to the shore to discharge and take in cargo. They are also completely screened by the masses of trees growing all round it from sea-ward observation.

“The population consists of coast Arabs and their slaves. The six villages in which they live are dotted round the shore, and may contain 300 souls in all. They seemed to be suspicious, and but for our having been accompanied by H.M.S. *Penguin*, would have given trouble. The ordinary precaution of placing a sentry over our exposed goods caused a panic, and the sarkar or head-man thought that he gave a crushing reply to my explanations, when he blubbered out, ‘But we have no thieves here!’

“Our route hence was s.s.w. to the Rovuma, which we struck at the spot marked on the chart as that at which the *Pioneer* turned in 1861. We

travelled over the same plateau that is seen to flank both sides of the Rovuma like a chain of hills from 400 to 600 feet high. Except where the natives, who are called Makonde, have cleared spaces for cultivation, the country, within the influence of the moisture from the ocean, is a dense jungle. The trees in general are not large, but they grow so closely together as generally to exclude the sun. In many places they may be said to be woven together by tangled masses of climbing-plants, more resembling the ropes and cables of a ship in inextricable confusion than the graceful creepers with which we are familiar in northern climates. Trade paths have already been made, but we had both to heighten and widen them for camels and buffaloes. The people at the sea-coast had declared that no aid could be got from the natives. When we were 7 miles off, we were agreeably surprised to find that for reasonable wages we could employ any number of carriers and wood-cutters we desired. As they were accustomed to clearing away the gigantic climbers for their garden ground, they whittled away with their tomahawks with remarkable speed and skill. But two days' continuous hard labour was as much as they could stand. It is questionable whether any people (except possibly the Chinese) who are not meat-eaters can endure continuous labour of a kind that brings so many muscles into violent action as this work did. French navvies could not compete with the English, until they were fed exactly like the latter. The Makonde have only fowls, a few goats, and the chance of an occasional gorge of the wild hog of the country.

"Little can be said about the country. By the occasional glimpses we got it seemed at masses of dark green foliage, except where the bamboos gave a lighter tint, or a *sterculia* leaves to yellow in anticipation of winter. The path we followed sometimes went along or across a 'wady,' in which we were smothered by the grass overhead.

"Such rocks as we could see were undisturbed grey sandstone, capped by ferruginous conglomerate. Upon this we often stumbled against blocks of silicified wood, so like recent wood that anyone would be unwilling to believe at sight that they were stones. This is a sure indication here of coal being underneath, and pieces of it were met in the sands of the river.

"When about 50 miles from the mouth of the Rovuma, the geological structure changes, and with this change we have more open forest, thinner vegetation, and grasses of more reasonable size. The chief rock is now syenite, and patches of fine white dolomite lie upon it in spots. Granitic masses have been shot up over the plain, which extends in front all the way to Ngomano, the confluence of the Rovuma, or Louma, and the Loendi. In the drier country we found that one of those inexplicable droughts had happened over the north bank of the Rovuma, and a tribe of Mazite or Mazitu, probably Zulus, had come down like a swarm of locusts, and carried away all the food above ground as well as what was growing. I had now to make forced marches with the Makonde in quest of provisions for my party, and am now with Matumora or Machumora, the chief at Ngomano, and by sending some 20 miles to the south-west I shall soon obtain succour for them. This is the point of confluence, as the name Mgomano or Ngomano implies, of the Louma and the Loendi. The Loendi is decidedly the parent stream, and comes from the south-west, where in addition to some bold granitic peaks, the dim outline of distant highlands appears. Even at that distance they raise the spirits, but possibly that is caused partly by the fact that we are now about 30 miles beyond our former turning-point and on the threshold of the unexplored.

"I propose to make this my head-quarters till I have felt my way round the north end of Lake Nyassa. If prospects are fair there, I need not return, but trust to another quarter for fresh supplies, but it is best to say little about

the future. Matumora is an intelligent man, and one well-known to be trustworthy. He is appealed to on all hands for his wise decisions, but he has not much real power beyond what his personal character gives him.

"The Makonde are all independent of each other, but they are not devoid of a natural sense of justice. A carrier stole a shirt from one of my men. Our guide pursued him at night, seized him in his own house, and the elders of his village made him pay about four times the value of the article stolen. No other case of theft has occurred. No dues were demanded, and only one fine—a very just one—was levied. Attempts have been made to make the Arabs pay, but they have always been resisted.

"So much has been said about Arab proselytism, that it was with interest inquiries were made about their success in converting the Makonde to the Mahometan faith. Here as elsewhere no attempts to teach had been made. Some Arabs asserted that it would be useless, for the Makonde had no idea of a Deity. On making inquiries about the gum-copal digging, I was shown a tree from which the gum was actually dropping, but they do not dig under the trees at present living. They choose the vicinity, in the belief that near to the modern trees those which yielded what is now considered fossil-gum must have grown. Here they dig; 'and,' said the spokesman, 'the first and second days we may labour in vain, but God may give it us after that.' To this acknowledgment of a Deity all responded. 'It is as He wills it.'

"The experiment with the buffaloes and Tsetse has not been satisfactory; one buffalo and two camels died. Had we not been in a Tsetse country, I should have ascribed this to overwork and bruises received on board the dhow which brought them from Zanzibar. These broke out into large ulcers. The symptoms were not those I have observed in oxen and horses. When stung by gadflies, blood of the arterial colour flows from the punctures. This may be the effect of the Tsetse, for when an ox known to be bitten was killed, its blood was all of the arterial hue. I had but four buffaloes for the experiment, and as three yet remain, I am at present in doubt.

"I write this short sketch in haste for an Arab who is passing down to the coast.

"DAVID LIVINGSTONE."

The PRESIDENT remarked that every geographer must be deeply interested in the ultimate result of this great expedition. The first point which Dr. Livingstone had to determine, after establishing a good base of operations, which he had succeeded in doing by making a friend of the influential chief of Ngomano, and ensuring supplies, was to advance to the northern end of Lake Nyassa. Afterwards turning to the north, he would endeavour to set at rest the question of the hydrography of that region. His object was to ascertain whether the waters flowed out of the Lake of Tanganyika towards the south, as Burton and Speke seemed to think when they examined that lake; or whether it might not turn out the reverse, namely, that the Lake Nyassa was completely closed to the north, and that the waters of the Tanganyika communicated northward. If he reached that lake, he would descend it in boats, to build which he had taken carpenters with him. When Burton and Speke were on the Tanganyika, they were both in extreme ill-health, and almost blind; so that their observations were necessarily imperfect, and the altitude of the lake, which they had fixed at about 1800 feet, had been very much doubted. There were geographers who thought the lake lay at a greater elevation; and as it was in the meridian of the vast lake discovered by Baker they conjectured that there might be a communication between the two. This was the great problem which Livingstone had to work out; and if it should be solved in the way suggested, then the lake Tanganyika would prove to be the ultimate head of the water system of the Nile. From Livingstone's well-known per-

severance and determination, and his success in making friends with the natives, he (the President) had every confidence that he, of all men alive, was the man most able to solve these difficult problems.

Colonel PLAYFAIR said the port north of the mouth of the Rovuma, which Livingstone had described, was one of which he had no personal knowledge; he should not, however, be surprised to hear of other harbours being discovered along that coast, for it had been most imperfectly surveyed. Only about a year ago an excellent harbour had been found by the Sultan of Zanzibar on the mainland, opposite the island; and he was now endeavouring to build a town there, but it is more than doubtful whether the experiment will succeed.

The following Paper was read:—

On the Physical Geography and Climate of Natal. By R. J. MANN, Esq., M.D., F.R.G.S., Superintendent of Education in Natal.

THE author exhibited numerous diagrams and maps in illustration of his subject, with a view to show how the peculiar climate and fertility of Natal depends upon its physical configuration. The colony is a portion of the narrow bevelled rim of the African continent, whose vast interior is an elevated table-land, with its coast presented to the moist winds of the Indian Ocean, and its interior frontier formed by the Drakenberg mountain-ledge, 7000 to 9000 feet high. In the northern part of the colony this mountain-ledge curves inwards, and from this hollow or bay the waters are gathered into one large river, the Tugela. From the salient point of the angular line of the Drakenberg, a mountain ridge projects into the middle of the colony, forming a high central backbone, from which short lateral spurs jut out. Each deep valley between these fingered ridges and to the south has its stream, and no less than fifty separate rivers find their way to the coast. These two distinct river systems of the colony—the one-rivered and the many-rivered—were necessarily caused by the zigzag direction of the great interior mountain frontier. There is a general slope upwards from the sea towards the interior; the gradient for the first 70 miles being 1 in 70. Up this slope the sea-breezes, impelled by a combined trade-wind and monsoon agency, blow almost continually, but most strongly in the summer, owing to the greater power of the sun on the land at this time, and it is in this season that most rain falls; the moisture-laden air, on reaching the heights, being no longer able to retain its humidity, discharges it in almost daily showers. Thus all the summer long the heat is tempered by clouds and the land fertilized by constant rains. During the winter, on the other hand, when the monsoon agency is at its least, there is almost perpetual sunshine and the weather is dry. The summer rainfall, as

the author had ascertained during eight years' observation, is about 24 inches; the winter rainfall only 6 inches. The temperature in summer commonly rises to 85° at midday, rarely to 97°, and at night very seldom descends to 52°. In winter it rises to between 70° and 80°, and rarely descends to 40°. There were five slight frosts in the eight years. The result of this peculiar climate, dependent on the geographical position and configuration of the land, is that sugar, coffee, arrow-root, pine-apples, bananas, and oranges, can be grown on the coast, whilst wheat, potatoes, and other food-crops, cattle, horses, and sheep thrive on the uplands, and Indian-corn and tobacco grow everywhere, the whole colony being only equal in area to one-third of England. The produce of the colony for one year, a year since, was 700 tons of sugar, 62,000 lbs. of coffee, 115 tons of arrow-root, 20,000 bushels of wheat, 500,000 bushels of Indian corn, 23,000 lbs. of tobacco; and there were then 290,000 cattle, 170,000 sheep, and 15,000 horses on its hills. The author explained the physical causes of the formation of the harbour of Natal, and gave many details of the mineral and vegetable productions of the country.

The Paper will be published at length in the Journal, vol. xxxvii.

The PRESIDENT, in returning thanks, said he had never heard a paper read which more clearly established the connection between climatology and geographical outline than this of Dr. Mann. It was Sir John Herschel who had induced Dr. Mann to make these accurate meteorological observations, extending over a series of years, and the paper communicated the results, in their connection with the physical geography of the region. Many persons might have been surprised at this, as there were few who could put them together in such a philosophical form; and still fewer who could develop their knowledge with so much eloquence as Dr. Mann had done in this *vis à voce* exposition of his subject.

Mr. CRAWFORD said he was very sorry he had little to object to in the eloquent discourse of Dr. Mann. His description of Natal was a great deal too attractive, it was enough to induce people to go there headlong. The climate, which was sub-tropical, was unequalled in the world; it surpassed that of Australia for salubrity and beauty. At the same time he thought Dr. Mann had overrated the fertility of the country. Arrow-root seemed to be the principal produce of Natal. Now the most valuable produce of a sub-tropical climate with an excellent soil would be sugar and coffee and not arrowroot. Again, nothing had been said about sheep and wool; and nothing about the vine. The country ought to produce tolerably strong wines. There were two other great defects of the colony, which Dr. Mann had discreetly passed over; there was not a single good harbour on the whole coast, that would admit a ship of 300 or 200 tons; and there was not a single navigable river.

Captain TOYNBEE said that the Mozambique current, which runs down between Madagascar and eastern Africa throughout the winter at a temperature of 78°, seemed to him to be the chief cause of the tropical climate of the coast districts of Natal. The reason why this tropical climate did not exist

on the western coast of Africa in the same latitude was, that at the same season of the year, the temperature of the sea is not greater than 50°.

Dr. MANN replied that if he had not been limited by the time allowed for his paper, what he said would have saved his friend Mr. Crawford from the necessity of asking these questions. The fact with regard to arrow-root was, that when the colony was first settled, men began to grow arrow-root before they were aware that they could produce more valuable articles. However, nine-tenths of those who began with arrow-root had abandoned the cultivation, and had turned their attention to sugar, coffee, and other things; and it was only in a few small corners of the country that arrow-root was now grown. With regard to the vine, he was surprised at Mr. Crawford's inquiry, because he had been giving them the results of a laborious investigation which showed that the summer at Natal is a summer of wet; therefore it would not answer, commercially, to grow the vine at Natal, for, to ripen the grapes easily, abundantly, and certainly, a dry summer is required. With regard to harbours, he had himself gone into the harbour of Natal, in vessels of 600 and 700 tons; and there was a vessel of 800 tons burden, now about to sail, that would have to go over the bar, unimproved as it is. The only difficulty was that ships of large burden could not pass over the bar except with a high tide; they were then tugged over by a steamer, occasionally just scratching the sand with their keels. But these difficulties would be got rid of by improving the harbour; and if his friend would give him 250,000*l.*, he would guarantee that a ship of 2000 tons should be able to enter the harbour within three years. It was entirely a question of outlay. With regard to sheep, when he first went out, nine years ago, he could not get a bit of mutton on his table; there was nothing but beef and antelope. Luckily, just at that time, it was discovered that sheep could be reared in the uplands; the result was that when he left the colony, a few months since, he could send to his butcher and get any amount of mutton he pleased.

Mr. CRAWFORD.—At how much per pound?

Dr. MANN.—At 6*d.* and 7*d.* a lb. for the haunch and saddle. He was confident that, with a large amount of enterprise in the uplands, before another five years had passed, they would have 500,000 to 600,000 sheep. The other productions of the colony were numerous, they could really grow almost anything. Tobacco succeeded everywhere; beet-root in the uplands grows perfectly well; ~~the~~ ^{the} ~~was~~ ^{was} ~~grown~~ ^{grown} with success; and they had grown cotton also with success: ~~the~~ ^{the} ~~was~~ ^{was} ~~grown~~ ^{grown} being that, up to the present time, labour was too costly for the cultivation of cotton in a general way. In many places the soil is so good that several crops are taken in succession off one piece of land without manuring. Three crops of oats have been produced from the same land in one year. With regard to Captain Toynbee's observation, it was true that something of the tropical condition of the coast did arise from the warm current from the north-east. Natal not only had the sun shining on its slopes, but it had a hot-water apparatus expressly provided to bring down additional heat. This, however, is certainly in Natal merely a subordinate influence. The coast climate is not largely dependent upon it. The proof of this is found in the fact that the sea-breeze is always refreshing and cool; and that the waters of Natal are crowded with fish. The Mozambique current does not come in close to land in Natal parallels.

Third Meeting, 10th December, 1866.

JOHN CRAWFURD, Esq., F.R.S., VICE-PRESIDENT, in the Chair.

PRESENTATIONS.—*William Lane Booker, Esq.; W. C. B. Eatwell, Esq., M.D.; and Rev. Thomas Wiltshire.*

ELECTIONS.—*Capt. H. Hamilton Beamish, R.N.; William Lane Booker, Esq. (H.M. Consul, San Francisco); William Debenham, Esq.; William Græme Dick, Esq.; William George Larkins, Esq., F.S.S.; Robert James Mann, Esq., M.D.; Henry M. Simons, Esq.; William Parker Townson, Esq.; Sir John E. Eardley Wilmot, BART.*

ACCESSIONS TO THE LIBRARY SINCE THE LAST MEETING, NOV. 26TH, 1866.—*Donations.* ‘*Meteorologische Waarnemingen in Nederland en Zijne Bezittingen en Afwijkingen van temperatuur en Barometerstand op vele plaatsen in Europa intgegeven door het Koninklijk nederlandsch Meteorologisch instituut.*’ Utrecht, 1852–62. ‘*Meteorological Observations made at Pietermaritzburg during the year 1865,*’ by Dr. Mann. ‘*The Official Gazette of the Institution of Hydronomical and Nautical Engineers.*’ A. W. Adams, Esq. ‘*Tide Tables for the British and Irish Ports.*’ Admiralty. ‘*Übersicht der Thatigkeit der Nicolai-Hauptsternwarte, etc.*’ St. Petersburg. Otto Struve. ‘*Eisenbahn- Post- und Dampfschiffs- Karte von Europa,*’ von Dr. Henry Lange. Berlin. ‘*Guide du Baigneur et de l’Etranger à Aix-le-Bains,*’ presented by S. M. Drach, Esq. ‘*Notice sur les Charmettes, et sur les Environs de Chambéry, 1824,*’ *ib.* ‘*Relation d’un Voyage à Bruxelles et à Coblentz, 1791.*’ ‘*Boletín dos Annaes do Conselho Ultramarino.*’ ‘*Nautical Magazine.*’ ‘*The Alps of Hannibal,*’ by William John Law, M.A. ‘*First and Second Reports on the Plains and Rivers of Canterbury, New Zealand,*’ by W. T. Doyne. ‘*Report on the Bar and Navigation of the Douro,*’ by Mr. Consul Crawford. ‘*Relatizioni dei Consoli Veneti nella Siria.*’ Italian Ambassador. ‘*Selections: Records Bombay Government.*’ ‘*Revue Maritime et Coloniale,*’ Ministre de Marine, Paris. ‘*Mémoires de l’Académie Impériale des Sciences de St. Pétersbourg.*’ ‘*Transactions of the Historic Society of Lancashire and Cheshire.*’ ‘*Comptes Rendus Hebdomadaires des Séances de l’Académie des Sciences.*’ ‘*Mémoires de la Société des Sciences Naturelles de Strasbourg.*’ And continuations of Transactions, Journals, and Periodicals.

Purchases.—‘*Pomponii Melae de Chorographia libri tres.*’ Gustavus Parthey. Berlin, 1866. ‘*Histoire Naturelle des Glaciers Suisses,*’ by Grouner. Paris, 1770.

ACCESSIONS TO MAP-ROOM SINCE THE LAST MEETING.—Six sheets of

Fullarton's Atlas of England and Wales, on a scale of 4 miles to an inch; presented by the Author. Three sheets of Stieler's Hand Atlas; presented by Dr. A. Petermann. Admiralty Charts, 32 sheets, presented through the Hydrographer, Capt. G. H. Richards.

The following Papers were read:—

1. *On the Physical Geography of the Lower Indus.* By Colonel

C. W. TREMENHEERE, R.E.

(Abstract.)

THE province of Sind extends from Mittee, on the north, where it joins the Punjab, to the sea near the mouths of the Indus; and consists of a continuous plain, varying in width, through which the river Indus passes. The physical aspect of this immense plain presents a very remarkable uniformity throughout—

1st. In the entire absence of channels for natural drainage.

2nd. In its almost uniform slope, both towards the sea, and away from the river-banks.

3rd. In its mineral character.

The slope of the valley, in a direct line to the sea, 330 miles, is 7·8 feet, or 9·3 inches per mile, and the lateral slopes on either side of the river are in many cases quite as much. The river, in fact, passes along a ridge, and is many feet above the land a few miles distant on either side of it.

The actual course of the river, measured on the map, is about 540 miles, and the surface slope during the inundation amounts to 4·78 of a foot, or about 5·7 inches per mile. The soil consists entirely of a very fine siliceous deposit, mixed with a variable proportion of argillaceous matter, with much mica. Such is the uniform fineness of the soil, that it is impossible to find a grain of sand in the plain as large as a pin's head.

The Indus, like other tropical rivers, is subject to annual inundation, the extent of which has been carefully registered for many years, both at Sukkur and Kotree. At the former place the rise from the low-season level amounts to from 13 to 15 feet, while at Kotree, though lower down the river, the rise is generally about 2 feet more.

The amount of silt contained in the river-water is remarkably great. From a series of careful observations made at Sukkur and Kotree, it has been ascertained that, at the height of inundation, the solid matter in the water amounted to about 43·6 parts in 10,000 by weight, and at the end of December to 17 parts. The discharge of the river at the former period is about 380,000 cubic feet per second, and at the latter about 68,000. Assuming a mean discharge

of 200,000 cubic feet, and that the solid matter amounts to 25 parts in 10,000, there would be 217½ millions of cubic yards of solid matter carried to the sea in a year, sufficient to cover 70 square miles with a deposit a yard in thickness.

If the Indus, like an ordinary drainage-channel, had taken its course through the lowest ground in the valley, it would have passed down the still existing channel, called the Rhein, into the Eastern Narra, and by Nowacote to the Run of Cutch. These old channels are still of very considerable size, and it is an interesting question whether they indicate the course of the river, or of any of its branches at any former period.

The country between the Narra and the present course of the river contains many remains of old channels, some of which extend for many miles continuously, and have well-defined banks with a glacis on each side. They have, in many cases, very tortuous courses; but are straighter as they approach the sea. There are many of these old channels to the eastward of the present course of the river, while such marks are rare and indistinct to the westward; so that one is led to the conclusion that the river has gradually worked to the westward. There is, unfortunately, no very authentic map of the Eastern Delta or of the country south of Hyderabad, showing the course of the old channels referred to, which terminate in the Run of Cutch. It is possible that formerly the chief outlets of the river may have been by these channels; and that the accumulation of enormous deposit derived from the river in the Run, in conjunction with an upheaval of the land on the border of the Run, which there are grounds to believe took place in 1819, may have forced the river to form new channels to the ocean. The completion of the survey of the Eastern Delta, and the extension of the series of levels over a portion of the Run of Cutch, will probably throw light upon the point.

During the inundation, when the river is carrying a very large body of water, its course is much more direct than in its low state; when the water not only follows the course of the larger reaches, but winds from side to side, and round the extensive sand-banks left in the bed. The surface-slope is thus, by an automatic action, continually adapting itself to the varying amount of discharge: and I think it may be generally stated of rivers flowing through such plains that the larger the body of water, and the less the surface-slope of the plain, the more direct will be the course of the river; and, on the contrary, the sharpness of the bends of a large river, flowing through such a plain, will indicate the existence of a considerable slope. I infer, in this manner, that the valley of the Tigris,

above the marshes, must have a greater slope than that of the Indus. The general statement I venture to make is that, with a fixed or virtually fixed maximum discharge, and an ascertained difference of level between any two points on a large river passing through an alluvial plain, the length of the river's course is also absolutely fixed. The longer, therefore, a river becomes by extending its delta to seaward, the greater tendency will there be to assume a more direct course.

The Delta commences about 7 miles south of the old town of Tatta on the right bank. The Buggaur and the Suttah (called the Hujamree near the sea) leave the river from the right bank, and the Mootnee and the Mull from its left. There are thus only five channels by which the river discharges into the sea.

The Western Delta has been recently surveyed by Captain Macdonald, and my map has been reduced from his survey, and accurately represents the district. The coast will be seen to extend in nearly a straight line from the mouth of the Hujamree to the entrance to Kurrachee Harbour, and is formed by a line of sand-bank topped by low dunes. The coast to seaward is extremely flat, and the extent of shore left dry at low water is very considerable. Behind the screen formed by the coast-line there is a very large area of marsh-land, permeated in every direction by tortuous creeks and channels, the tidal water to supply which is derived from a number of wide but shallow openings on the coast-line. These openings have been most improperly called mouths of the Indus; but it is obvious that they are, in fact, merely passages for the tidal water to and from the lagoon. Within the lagoon the channels are well defined, though very tortuous, and deepen gradually as the distance from the Indus increases. The soundings in those to the northward are as much as 3, 4, and $4\frac{1}{2}$ fathoms at low water, at the distance of many miles from the sea. The mud-banks within this lagoon have now been raised nearly to the level of ordinary high-water mark, by deposits of mud on which mangrove and soda plants are the only vegetation. This mud is blue-black in colour, and very fine; but when dried it becomes of the same light-drab colour as the Indus mud.

The bay and harbour of Kurrachee are situated at the extreme northern end of this delta. The bay is formed by Manora Point, a natural hill consisting of clay-beds capped by conglomerate, at the southern extremity of a reef about 10 miles in length, by which it is united to the mainland, and on which the action of the surf, which breaks directly upon it, has formed a beach capped by a narrow ridge of blown sand.

The opening of the bay between Manora and Clifton is about $3\frac{1}{2}$ miles wide, but this opening is blocked by rocky islands in the centre, and by the island of Keamaree at some distance in the rear.

The entrance to the harbour, and the only navigable channel, is close to Manora: the anchorage extending from within the shelter of that point to opposite the western end of Keamaree. With the exception of this comparatively deep portion, and of two branches of no great extent, the whole space within presents, at low water, an area of extensive mud-flats, some of which are covered by mangrove-bushes. The tidal area is generally at a level of 6 or 8 feet above low water, or from 1 to 3 feet below high water at spring-tides.

The surface consists of a layer, from 3 to 6 feet thick, of stiff black mud formed of silt mixed with decayed vegetable matter, lying on a bed of sand of variable quality—in some places fine and very thick, in others coarser—containing sea-shells, or approaching gravel. The whole overlies a bed of stiff blue clay, which appears to be the natural surface. The superficial deposits extend from 9 to 25 feet below low-water mark. On examining the superficial deposits it has been found that the black mud, mixed with vegetable matter, is identical with that formed on the mud-banks within the lagoon which has been described. Its mineral character, as well as that of the fine sands below it, and the whole surface of Keamaree, is marked by the presence of a very fine white quartz mixed with mica, and is identical with the silt carried to sea in the waters of the Indus.

The agency by which the Indus silt is swept so far to the northward will be understood by referring to the map of the coast-line.

The South-west Monsoon breaks upon this coast early in May, and lasts without cessation until the middle of September: during the whole of which period a heavy surf beats upon the shore. It is precisely during this period that the Indus is discharging its flood-waters, so heavily charged with sand and silt. The direction in which the surf breaks is marked upon the map by a series of parallel blue dotted lines, which form a considerable angle with the general coast-line. The result of this oblique action of the sea-stroke, upon a coast exposed to winds which prevail continuously for so long a period, is not only to force matter held in suspension in the water, in the direction of the stroke, but, as explained by Sir Henry de la Beche, to produce a shore current. The manner in which the deposit in the lagoon, and within Kurrachee Harbour, has been formed, is extremely well described in the 'Geological Observer,' and it would appear that the whole shore-line, between the mouths

of the Indus and Manora, has been formed by the action of the sea-stroke forcing the sand and silt, discharged by the river, in the direction of Kurrachee Harbour.

The rise of the tides on this coast varies from 8 to 11 feet at springs. Their course is in a direction parallel to the coast-line: the flood-tide coming from the north-west, and the ebb running in the opposite direction. During the monsoon months there is a current in the offing, setting to the south-east, in a direction contrary to that along the coast, which has been described. Both currents are produced by the same cause, the action of the long-continued sea-stroke on a coast-line forming a considerable angle with the crests of the monsoon waves.

By the action of the current in the offing it is probable that much silt, which has been swept to the northward as far as Kurrachee Harbour, may be again carried to the southward, and be eventually deposited in the Eastern Delta channels, or carried into the Run of Cutch.

The action which I have endeavoured to trace must have a considerable influence in checking the growth of the Delta of the Indus to seaward: the surf of each successive Monsoon, exerting its immense power in removing any deposit which would otherwise tend to extend the channels by which the river discharges itself into the ocean. The progress of the delta to seaward is thus dependent upon the advance of the whole coast-line between the mouths of the river and Ghuzree, which must be extremely slow.

The paper will be published *in extenso*, with Map, in the Journal, vol. xxxvii.

Mr. W. P. ANDREW (Chairman of the Scinde, Punjab, and Delhi Railway Company) said that the importance attaching to the harbour of Kurrachee could only be comprehended when we kept in mind the vast extent of our Indian possessions, containing an area equal to the whole of Europe, without Russia, and a population of two hundred millions, and having almost every variety of climate and soil, producing in abundance the staples of our home manufactures, and the fact that there were only four seaports around the enormous circuit of the coast of Hindostan. Two of these were very bad, one being merely an open roadstead. Bombay was the best one, and, though Kurrachee had been decried in some degree by the author of the paper, he thought he should be able to prove that the gallant officer was wrong in his opinion, and that at Kurrachee also we possessed a valuable harbour. The route of the Indus had always been regarded by our statesmen, from the time of Sir Henry Pottinger to Sir Charles Napier and Sir Bartle Frere, as the most important political line in our Eastern possessions, and if an erroneous impression obtained of the deterioration of Kurrachee, the natural port of that route, it might deter its improvement for a considerable period. A few words stated to have been used at another meeting in this country lately, had produced a most depressing effect upon the inhabitants of Kurrachee, so much so that they had memorialised the Government; and he had no doubt that

Colonel Tremenheere would regret that such statements had been made. For instance, it was reported that a million of money had been spent upon Kurrachee Harbour.* That was really not the case. A quarter of a million was spent in various improvements; but of that sum only 57,000*l.* was spent upon the work of removing the bar. Another statement was said to have been made, to the effect that the port was a decaying port. So far from this being the case, during the last ten years the commerce of the port had risen from 1,400,000*l.* to upwards of 4,000,000*l.* last year; † the municipal dues from under 4000*l.* a year to 24,000*l.*; and the population from 40,000 to 60,000; and there were new streets and houses more resembling those of an English town than any other town in India. These facts he had taken from official returns compiled under the authority of Government. How could any port give more striking proof of growing prosperity. Sir Charles Nicholson, however, and Mr. Markham, the gentlemen who were reported as having used the expressions unfavourable to Kurrachee, had since assured him that they had been erroneously reported: and they entirely disavowed the statements attributed to them. With regard to the engineering part of the question, it was not for him to enter into details; but it might easily be shown that the views of the gallant officer were quite erroneous. His own experiment with the bottles offered a singular confutation of his theory, for not a single bottle was found to have got into Kurrachee out of the thousand bottles which he placed on the surface of the water at the mouth of the Indus. They made the voyage in the direction of Kurrachee, and they might possibly have gone into the mouth of the harbour, but, according to the gallant officer's own statement, met another current which carried them away somewhere else. The only other point

* This was in an erroneous report of a discussion at a meeting of Section E at the British Association, Nottingham.—[Ed.]

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ANNUAL TRADE OF KURRACHEE HARBOUR.

Year.	Imports.	Exports.	Total.
	£.	£.	£.
1843-44	121,150	1,010	122,160
1844-45	217,700	9,300	227,000
1845-46	312,900	40,500	353,400
1846-47	293,400	49,300	342,700
1847-48	287,872	154,730	442,680
1848-49	344,715	107,133	451,849
1849-50	419,352	114,378	533,731
1850-51	425,831	196,461	622,293
1851-52	489,220	244,222	733,343
1852-53	535,690	376,337	800,000
1853-54	508,793	376,310	885,103
1854-55	575,196	346,893	922,089
1855-56	629,813	604,440	1,234,253
1856-57	685,665	734,522	1,420,187
1857-58	1,081,100	1,078,100	2,159,200
1858-59	1,540,606	1,044,273	2,584,879
1859-60	1,712,752	947,336	2,660,088
1860-61	1,658,305	1,025,345	2,683,650
1861-62	1,593,670	1,372,884	2,966,554
1862-63	2,242,818	3,287,594	5,530,412
1863-64	2,474,737	4,188,073	6,662,810
1864-65	2,316,700	2,928,015	5,244,715
1865-66	2,019,550	2,792,793	4,812,343

that struck him in the paper related to the mica found on the bar. The mica came down from the Indus, and was, no doubt, mixed with the sand on the shore; it would, as a matter of course, mix with other sand and silt which came in when the South-west Monsoon prevailed. Regarding the facilities of entrance to the port, he could speak with some authority, inasmuch as he had, from his official connection with the undertakings which had been named, been concerned in sending 300 ships from this country to Kurrachee; and they had not lost any ship entering or leaving the harbour except one, and that occurred through the fault of the pilot, who had most improperly left the vessel during the night.

The CHAIRMAN said he held in his hand a table of the exports and imports of Kurrachee, and they corroborated what Mr. Andrew had stated. Considering that Kurrachee had no products of its own, the increase of trade was wonderful. It would be a matter of deep regret if the harbour of Kurrachee was lost to us, for he believed it was the safest and best harbour in all Western India, Bombay excepted.

Mr. W. PARKES said that the question raised by Colonel Tremeneheere, of a coast current which he supposed to be running from the mouth of the Indus northward, had always been considered to be connected with the prospects of Kurrachee Harbour, although Colonel Tremeneheere in his paper had drawn no definite conclusion to that effect. But the only logical conclusion which could be drawn from Colonel Tremeneheere's premisses was this, that the sediment brought by the coast current was gradually deteriorating the harbour, and that it cannot be very long before the harbour will be completely destroyed. Colonel Tremeneheere attributed very great results to the influence of this coast current. A bed of sand over the whole area of the harbour from 9 to 25 feet in thickness, mud-banks 3 to 6 feet thick on the top of this; a sandy island (Keamaree) 2 miles long, a quarter of a mile wide, and 10 to 20 feet above the sea level, a spit of sand running southward or 2 miles from its western extremity, and the harbour channel forming the anchorage itself, were all the work of the coast current. These were vast results, and if the cause which produced them were still in action, we must look for correspondingly large effects still being produced, and those effects cannot but be fatal to the permanency of the harbour. In justification of the generally accepted conclusion that Colonel Tremeneheere does connect his theory with the anticipated absorption of the harbour into the Delta of the Indus he would refer to the circumstances under which it was first promulgated. In the early part of 1864 he was on a visit to Kurrachee, under instructions from the Government to advise as to the conduct of some works for the improvement of the harbour which had been designed some years previously by the late Mr. James Walker with his assistance. These works were under the charge of Colonel Tremeneheere as Chief Engineer of the province; but he had from the first expressed himself as strongly opposed to their principle. Several conferences took place between them solely on engineering questions, without, however, any agreement being arrived at. At these conferences the coast current was never mentioned, and Mr. Parkes had no suspicion that any theory concerning it was held by Colonel Tremeneheere. Mr. Parkes made his report in March, 1864, and Colonel Tremeneheere made his in the May following. It was in this report that the coast-current theory was first promulgated, and it was done in this way. Colonel Tremeneheere asserted that Mr. Walker had been misinformed on many important points with regard to the physical characteristics of the harbour, but the only point cited in support of this assertion was the existence of this coast current. Even then, however, he abstained from saying more than that it was an important element. He did not say how it affected the question, and to this day he has never directly stated what effect it has on the general economy of the harbour. That it must be destructive of the harbour is a

conclusion which others have drawn—and, as Mr. Parkes submitted, inevitably drawn—from Colonel Tremenhœere's premisses. Now, Colonel Tremenhœere admitted that the existence of this current could not be made evident by direct observation; it could only be deduced from well-known physical conditions. The conclusion was therefore, so far at least as it affected the harbour, hypothetical, and Mr. Parkes met the hypothesis by a fact. The harbour is not filling up. A comparison of official charts made in 1838, 1849, and 1854, with the surveys made under his own directions in 1858, showed a maintenance of the same capacity throughout those twenty years. Local changes there might be, but no general deterioration. Again, old seafaring persons who had known the harbour for fifty years, never remembered it better than in 1858. It was, therefore, clear that there was no deterioration; and if deterioration be a necessary consequence of the hypothetical coast current, the hypothesis must give way. Colonel Tremenhœere would appear himself to have felt this inconsistency, for in his paper just read he had stated that the sediment brought by the coast current was carried back again by an offing current in the opposite direction. It was curious that this current was not mentioned in his first report; in his second report it was alluded to as well known to exist, but as having only a very slight bearing on the question; but now, in his paper just read, it was made the very salvation of the harbour. So far as it affected the harbour question, then, the coast-current theory was cancelled by the offing-current theory. But Mr. Parkes could not accept either theory, though the practical import of the first might be destroyed by Colonel Tremenhœere's late confession with respect to the second, and though the existence of this second current, at least in the immediate neighbourhood of the harbour, was indisputable. With regard to the theory itself, Colonel Tremenhœere thus explained it: that the action of the sea-stroke on a line of shore forming an oblique angle with the crests of the waves was to produce a coast current, and he cited De la Beche in proof of this position; but De la Beche says it is the wind and not the sea-stroke which produces the current, and the wind is shown by actual observation never to blow obliquely on the shore in question, but at right angles, and consequently no coast current would be produced. The sea-stroke would have a different action; it would drive sand before it, but would produce no current in the body of the water. And even with respect to the sea-stroke, late observations showed that it was not always, even if it were ever, oblique, for during the last Monsoon it was distinctly observed by competent witnesses to have a direction which would fall dead on to the shore. The very foundation of Colonel Tremenhœere's theory was therefore false. Colonel Tremenhœere had, however, adduced two facts in support of his theory which were worthy of notice. The first was the existence of mica in the mud-banks of the harbour, which mineral was only found in the valley of the Indus. But was it not natural that the sea water for many miles from the mouth of the Indus should have diffused through it minute particles of this substance, some of which it would necessarily deposit in all sheltered inlets? This proved nothing. The second fact was the result of an interesting but very incomplete experiment made by Colonel Tremenhœere during the Monsoon of 1865. He set afloat 864 bottles from the mouth of the Indus, and 214 of these, or about one-fourth, were found on the shore a few miles south-east of Kurrachee, none in or near the harbour, but all congregated in a remarkable manner at a distance of from 4 to 7 miles from it. This fact at first sight seemed to fit in well with the preconceived theory, up to a certain point, but a further examination showed it to be quite incompatible with that theory. These bottles were set afloat in the strong outset of the Indus during flood, when it runs 5 or 6 miles an hour. Was it to be supposed that immediately on emerging from the river-mouth they turned sharp round to the northward and followed the coast? Was it not far more natural to suppose that

they were carried far out to sea, and then drifted by wind and eddy currents back on to the shore? This latter supposition was much strengthened by the fact, that, of 216 bottles which were set afloat when the tide was rising and the outset consequently weak, only two stray ones were picked up, while of 144 which were set afloat in the hour and half after high water, when the outset was strongest and the course out to sea most free, no less than 75, or more than half, were picked up. Thus, then, though the gross result might at first sight seem to favour the coast-current theory, the first step in the examination of the details scattered it to the winds. Mr. Parkes was quite sure the onward progress of the port of Kurrachee would not be checked by Colonel Tremeneere's coast current.

In answer to the Chairman, Mr. Parkes stated that the amount expended upon that portion of the works which had been brought to bear upon the entrance was 57,000*l.*, and not a million, as had been stated elsewhere. A further sum of 200,000*l.* had been expended upon internal works which would ultimately affect the entrance, but they did not do so at present. The 57,000*l.* had been expended in the construction of a bank of stone 2 miles long upon the Keamaree sand-spit. The object was to cut through the bar in a direct line with the main harbour channel; and though this was not yet accomplished, yet the bar had been reduced in width from 400 to 200 feet, and its crest lowered 3 feet. In the mean time the circuitous channel round the end of the bar had been widened from 600 to 1200 feet, so as to allow of a more direct course into the harbour. The works were as yet incomplete, and their anticipated effects still more so, but the entrance had never been in so favourable a condition as it was at present, though some inconvenience from the changes in the channels had been felt two or three times.

Mr. J. BRUNTON (Chief Engineer of the Scinde Railway) returned from Kurrachee, where he had been a resident for nine years. He had watched very particularly not only the conformation of the harbour, but the works which had been going on under Mr. Parkes. Colonel Tremeneere spoke of Manora Point as the western boundary of the Delta of the Indus. He thought the gallant officer was wrong, and that the Delta of the Indus must be considered to terminate at Ghuzree Point. That would place Kurrachee Harbour quite beyond the action of any current produced by the river Indus that might pass up the coast. He had had constant communication with Captain Giles, and with many officers of the port of Kurrachee, and they were all, without exception, of opinion that the current ran down the coast, and not up it; for all vessels, immediately they cross the bar of Kurrachee, are seen to be carried by the current at the mouth of the harbour down the coast, rather than up. With regard to the harbour works, two million tons of silt had been carried out of the harbour and thrown into the sea, at a cost of 6*d.* per ton. The whole harbour had thus been deepened and enlarged. When he first went there, twenty large full-rigged ships would have found it difficult to swing at their anchors in Kurrachee Harbour. When he left a few weeks ago, there were thirty-one large square-rigged vessels in the harbour, able to swing without any inconvenience. That was a proof that the groyne which had been formed had improved the harbour.

Captain CONSTABLE (late Indian Navy) said he could corroborate the remarks of the previous speakers. He had the honour to serve twenty years in the Indian Navy, which all geographers would recollect had rendered itself rather famous for its surveys. He was in the surveying-ships fourteen or fifteen years, and a great deal of his surveying operations were on the west coast of India and at Kurrachee. In 1839 the place was looked upon as a creek almost unfit to take ships into; but since then it had gone on improving. There was evidently no silt carried into it. In 1854 he (Captain Constable) was engaged as assistant upon the chart of Captain Grieve. He drew that chart, and he

had the means of comparing it with the Government Survey made in 1838; and he found an improvement of nearly 2 feet more water on the bar and in the channel. Again in the present year, a book, entitled 'The West Coast of Hindostan Pilot,' had been published by the Admiralty, written by Captain Taylor, of the late Indian Navy, one of our most able surveyors: in this work he told us that it was reported there was a depth of 26 feet at high water on Kurrachee Bar. Now, there never was such a depth all the time he knew Kurrachee. All these facts showed that the harbour was improving, and that there could not be any silting-up in operation. With regard to the current, no north-west current had been experienced in the Monsoon; and Captain Grieve, in his 'Sailing Directions for the Coast,' published by the Bombay Government, said he was not aware of the existence of any currents beyond occasional sets to the south-east. He spoke of the offing, where ships navigate. He could also corroborate the fact of the south-west wind. Although called the South-west Monsoon, it was not south-west exactly; certainly not on the coast of Scinde, for there its general direction is w.s.w. In reply to the Chairman, Captain Constable said that he knew of no harbour on the west coast of India equal to Kurrachee, except Bombay.

Major-General Sir W. GORDON, R.E., said he rose in consequence of the absence of Colonel Tremenhœre, to state that the paper which had been read was drawn up by him in his official capacity as officer in charge of public works in that district. Not being satisfied with the works for the improvement of Kurrachee Harbour, he instituted investigations as to the physical geography of the lower part of the river. In his paper he had, with good taste, avoided disputed points of engineering; and it would have been in good taste if those gentlemen who had made an attack upon him had followed his example.

Captain MAURY said he was not prepared to discuss the question of Kurrachee, but he desired to do homage to a philosophical mind and thank Colonel Tremenhœre for the very capital paper that had been read. He thought the mouths of the Indus confirmed in their mute way the fact that there is a current there. From the information communicated that evening, it did not appear that the current, because it swept silt in the direction of Kurrachee Harbour, deposits it there, for the harbour appeared to be improving. There was no doubt there is a current, which carries the silt away as fast as the river brings it down. There was nothing more instructive upon this point than to compare the deltas of various rivers. Take, for instance, the delta of the Mississippi. The Mississippi pours down tremendous quantities of silt into still water; there is no current in the Gulf at that place, and the consequence is that the river carries out its bed into the Gulf of Mexico, and then makes a channel for itself on the top of the bed. If there had been a current there, that silt would have been swept away, as it is from the Indus, as fast as it was brought down. Again, if we turned to the Amazon, the Rio de la Plata, and other great rivers, we find there are currents that not only sweep away the silt as fast as it is brought down, but they cut away the mainland, and with their eddies scoop out and make large recesses into the land from the mouths of the rivers. The difference between the Mississippi and the Indus is this:—the Mississippi discharges its silt into still water; the Indus discharges its silt into running water. Whether the current from the Indus sweeps with more force to the south-east or north-west, the probability, according to the statements made by the gentlemen present, seems to be in favour of the south-east.

The CHAIRMAN expressed his regret that Colonel Tremenhœre was not present to defend his own theory, but he had had two able defenders. It was not the business of the Society to decide questions in dispute, like the present one; they had only to thank the writer of the paper, and also the gentlemen who had taken part in the discussion, for the valuable information they had afforded.

2.—*On the District of Lake Pangong, in Tibet.* By Capt. H. H. GODWIN-AUSTEN, F.R.G.S., Assistant in the Trigonometrical Survey of India.

THE author left Leh to survey the shores of Lake Pangong in July, 1863. North of the Indus, from its junction with the Dras river, lies a high range of mountains, which separates the Indus drainage from that of the Shayok or Nubra. The passes over this range are of great elevation; on the direct road from Leh to the Pangong Lake there are two: viz., the Chang La, 17,470 feet, and the Kay La, 18,250 feet above the sea-level. Having crossed the Chang La to the village of Tanksé, the surveying party proceeded along the valley leading to the western extremity of the lake. The stream which flows down the valley contains but little water, and the *talus* from the mountains partly blocks up the passage; the ridge of Surtokh, which forms the watershed across the natural exit from the Pangong is entirely formed of loose shingle, brought down a somewhat large lateral ravine. If the waters of the Pangong (which have now no exit) should reach the altitude they formerly attained, they would force a passage across this barrier.

A Trigonometrical station of the Indian Survey lies close to the water's edge, its height being 13,931 feet above the sea-level. The waters are of an intense blue colour, clear as crystal, but too saline to be drinkable. The author commenced his march along the southern shores on the 22nd of July. He pursued this route until he came to a point where the lake contracts to very narrow dimensions; he then crossed to the northern shore, and reached to within a short distance of Noh, a Tibetan town of the province of Rudok, where he was compelled to turn back, owing to the entreaties of the governor. Beyond the contracted part the lake again expands for a long distance; it then again narrows, and further east again expands into a fine sheet of water, the termination of which is unknown. The first, or lower lake, is 40 miles in length; the second 33 miles; and the upper, or easterly portion, at least 18 miles.

Captain Godwin-Austen communicated his observations on the physical geography of this remarkable lake, and showed that its waters must formerly have been fresh, and must have attained a much greater elevation than they do at the present time. Myriads of fresh-water shells now strew the shore, and lie so thick in some of the bays that they can be taken up by handsfull. At present the waters are too salt to nourish a single molluscous animal. The lower lake does not contain in its waters or on its banks, a vestige

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have taken in all cases as the point of departure. The map which I have drawn according to their information, and which I have sent to Dr. Petermann, will soon be published, and it will give you a more accurate idea of the country than I am now able to do by mere description. I have besides succeeded in obtaining information of more than twelve new routes towards Tibesti, Borgu, Air, and other countries, which will tend to fill up the vacant places in our maps of the Great Desert.

I was received here at Kaur very ungraciously by his Tebugian Majesty, on account of my being a Christian, for since the Snussi sect have taken possession of the education of the Kaur people, they have become thorough fanatics. The Mahommedans have spread their religion with incredible rapidity towards the interior of Africa.

I hope I shall soon be able to decide whether my next march will be to Wadai or towards the south; in ten days probably I shall be able to start, either alone or by a caravan. We have had no news from Bornu for the last five months; some say there has been war in that country, and others that the Tuaregs have cut off the communication in making a razzia on Kanem. On this account no one is willing to undertake a journey southward from this place. Some days ago I hired a guide to accompany me to Kuka, for the exorbitant sum of 300 francs; but a little before the day fixed for our departure I was warned that he was a harami (highway robber). I had much difficulty in recovering my money, and did not accomplish it without losing a portion. To-day I am in treaty with another man, whose honesty and knowledge of the road are spoken of highly; but he demands 100 *thalleri*, more than 500 francs. I cannot, however, stay here for ever, and there is nothing especially attractive in this little kingdom in the heart of the Great Desert.

I shall send this letter *viâ* Mursuk to Tripoli, to the care of M. Rossi, the Austrian Consul, who takes charge of my correspondence.

GÉRHARD ROHLFS.

SIR,

Kuka, 15th August, 1866.*

I have the honour to apprise the Royal Geographical Society of my happy arrival in Bornu, on the shores of Lake Tsad. Received by the Sultan with his well-known affability, I have now great hopes of being able to penetrate from here to Wadai, as it appeared at first as if even this were vain to expect. It is quite certain that the Sultan of Wadai was innocent of the murder of Beuermann, for at the time that Beuermann was strangled in Mao the Sultan was in Bagirmi. The day before yesterday I had the honour of translating a letter of Lord Clarendon's into Arabic, and I failed not to emphasise the passage wherein the noble Lord begs his Highness to consult his own heart, and not to follow the malignant whispers of his counsellors. This letter had lain here for upwards of ten years without the Sultan being acquainted with its contents. We are now at the end of the rainy season, and the Tsad begins to get fuller. You have probably already learnt, through Petermann's 'Mittheilungen,' the interesting questions concerning *Tu* or *Tibesti*. I had hoped to have been able to go to Borgu with a caravan proceeding northerly: as yet I have found no opportunity of meeting with a single native of that country.

The roads being impassable I am prevented at present from leaving this capital: I shall probably be able to give you by next caravan more definite information about my departure for Uara. The insatiable courtiers of the Sultan of Kuka have left me very bare of money, so that I fear I shall not be able to show myself at the Wadai Court with proper dignity as a representative

* Translated by S. M. Drach, Esq., F.R.G.S.

of Christendom. The well-known generosity of the London geographers, whose active support I have known *thrice*, makes me hope that my present needs will not be disregarded. And if I fortunately arrive this year in the Wadai Sultan's capital, I hope to arrive in the summer of the following year in London, and give your learned assembly an account of my journeys. Being nearly certain of the success of my request to the Royal Geographical Society, I beg you to forward the money to *Tripoli*, in Barbary, Mr. C. A. A. A., who will satisfy those persons of whom I have to borrow money here.

I also inform you of the very interesting and peculiar petrifications in the Ade-“*Ames*” and in the *Geis* mountains, through which my way led between Kaur and Kanem, and from which I brought several specimens. They are partly quite closed hollow stones, often filled up with sand, looking like vesicles, from the size of a pea to that of a fist, partly long tubes, hollow inside, of glassy sound, and partly leaves, which I at first took to be petrified fern-leaves, and afterwards for petrified intergrown “Had”-plants, *Anabasis alopecuroides*. I have since rejected this idea, and do not yet know what to think of these curious forms. I have collected many specimens of them, and the learned in this branch of science will probably decide to what class these strange forms appertain.

GÉRHARD ROHLFS.

2. On a new Harbour opposite Zanzibar.

(Extracts from a Letter of Dr. KIRK to Sir R. I. MURCHISON.)

Soon after my arrival in Zanzibar I had occasion to visit the mainland, in company with Captain Pasley, R.N., at whose disposal the Sultan kindly placed his steam-yacht for the trip.

Our object was to inspect a place on the coast a little to the south of Zanzibar Island, where His Highness proposes establishing a harbour for the convenience of vessels carrying off the produce of the interior. The point selected is in lat. $6^{\circ} 49' S.$, and long. (on chart) $39^{\circ} 17' E.$ It possesses great natural facilities, to which it is proposed to add buoys, to mark the passage, and a fort to give security. In the neighbourhood a large body of slaves are engaged clearing a space for building, and the old corvette, *Victoria*, one of His Highness's ships, will be moored inside the harbour. Leaving Zanzibar about 10 A.M., we reached the harbour of Mozozima, or as it is now called Dar Salam, in time to have entered had we desired: we preferred remaining at anchor in the bay outside the reefs. This anchorage is well protected, by a group of small islands, from the south-west monsoon, and offers a most secure ground for ships of any size. These islands are called the Goonja: they are low flat spots, with steep or overhanging edges, from the constant action of the water on the coarse and loose tertiary sandstone of which they consist.

The following morning we passed up the harbour under steam. At a mile and a half off shore the reefs came together so as to leave only a narrow passage, in which, however, there is not less than $5\frac{1}{2}$ fathoms, so that any vessel visiting this coast could easily enter, if the two points of reef were buoyed. Once inside the reef the passage is straight and clear, deepening as we advance, and with 7 fathoms between the sand-heads, which slightly overlap each other and completely close the harbour, except for a small line S.S.W., where it is open. Within the northern sand-head there is a recess, where the ground has been cleared for the town.

To the south there runs a deep creek, one mile wide, with from 7 to 9 fathoms water, extending 4 miles, and shallower arms reaching still further. The banks of this natural and perfect harbour are steep, and about 30 feet high in some places, so that there is no continuous mangrove-swamp near the place. The

country beyond is smooth and flat, with a distant ridge of about 500 feet, seen in the distance, perhaps 10 miles off. The vegetation is such as we are familiar with in tropical Africa, but containing many new species, which on this occasion I had not time to collect. The baobab-trees, which were still in full leaf, indicated a much moister region than we find on the Zambezi, where during the cool months these trees are bare and leafless. While we remained there was always a pleasant cool breeze most refreshing to us.

When entering I had observed certain columns on the northern side, about a mile above the harbour mouth, and a small ruined edifice a few hundred yards further on, which had attracted my attention as being the only stone buildings visible. These are ascribed by the Arabs to the Portuguese, which seems quite improbable. To the old town the natives give the name of Bongoni. The ruined building consists of four walls, enclosing a space 8 yards long and 4 wide, placed north and south. In each of the three southern walls we find a doorway, while the north wall has an arch of carved stone within a square moulding. This arch opens to a semicircular recess, or chancel, having three tiers of niches cut in stone. Outside the southern gate there is a deep well of brackish water. This building seems to belong to the older Arab times, possibly before the East coast fell under the dominion of the Portuguese: this I conclude from the chancel pointing to Mecca, and not to the east. The columns proved to be very elaborately constructed, grand, obviously Moslem, and probably of more recent date. Some have very neatly cut Arab inscriptions, while others have old pieces of Oriental pottery inserted in the face.

The geology of the coast is extremely simple; the section of 30 feet of the upper strata. Those on the top are of sand, full of existing species of marine shells. This is the general surface-stratum of the plain, covered with a layer of soil more or less thick; the marine-shells, however, showing wherever the sand comes to the surface. Under the sand we have a coarse stratified sandstone, also of marine origin, and tertiary or even post-tertiary date.

This tertiary band coats the East African shore, and was found by us extending up the valley of the Rovuma for 50 miles, where it met with the stratified but older metamorphic rocks. On this coarse grey sandstone is found silicified wood, but it must not be confounded with the older sandstones which overlay the coal, and which also have superficial silicified wood on them.

At Mozambique the island consists of this recent tertiary sandstone, cemented with much lime, the *débris* of shells and coral, while the opposite shore is of monocliferous limestone, with sharks'-teeth and crustaceans.

The result of our expedition was to convince us of the value of this place as a harbour. Whether it will be able to draw trade from Zanzibar on the one hand, and the other coast ports, its rivals, on the other, is very uncertain.

3. *Land Journey along the Shores of the Persian Gulf, from Bushire to Lingah.* By W. H. COLVILL, Esq., Assistant-Surgeon, Bushire.

(Communicated by the INDIA OFFICE.)

[EXTRACTS.]

I TAKE the liberty of forwarding a brief account of the country travelled over in my land journey from Bushire, following the coast line, to the port of Lingah.

My party consisted of five private servants and two muleteers, with three horses and seven mules. I carried no tents and little baggage, so as to be enabled to move more easily. I experienced the greatest kindness all along the

road, but more especially in the Dashtie country, where the chiefs are wealthy and the people contented.

After crossing the marsh between Bushire and the mainland, I entered the northern end of the plain. The river valley is about 15 miles wide at the mouth, and narrows to about 5 miles at the head, and south. The margins are little villages at distances of from 3 to 6 miles. These villages consist of from thirty to fifty huts, made entirely of date-leaves plastered over with mud, and there is generally a square tower either of stone or mud in the centre of every village. The chief towns of the plain are Aram, Khormuj, and Kakee. Khormuj is the principal residence of Hyder Khan, chief of the Dashtie country. It consists of about 150 stone or mud built houses, occupied for the most part by the followers of the chief. The fort is large and new, and the rooms are richly decorated in the style of Shiraz. Besides the usual quantity of mirrors, gilding and painting of flowers, nightingales, wild animals, and Persian beauties, on a panel of a door in one of the chief rooms is the double-headed eagle of Russia. A small stream runs from the hill down to the town, and drives a number of flour-mills.

The town of Kakee is the residence of Jamil Khan, chief of a sub-district of Dashtistan. It is twice the size of Khormuj, but not so well built. The fort in process of construction is very fine. The river Charactagh, rising in regions about Shapur, and passing through Khona Zuneon near Shiraz, runs within 30 miles of Ferozabad, and opens into the plain of Khormuj round the north of Khoe Namik, between it and the low sandstone range. It passes across the plain and opens into the sea at Khore Ze-arad, where it enters the plain of Khormuj: it is 120 yards wide, and on the day I crossed it it was $3\frac{1}{2}$ feet deep; but it was said then to be unusually low, for at this season it is almost always necessary to cross it on a raft. It is here called the River Moon, and even now it is slightly brackish. Vessels of forty or fifty tons ascend it almost opposite to Kakee. A natural canal of brackish water, 12 yards wide and 2 feet deep, called the Shura, passes from near the hill of Aram down the centre of the plain and opens into the Moon. The plain of Bussaaf is triangular in shape. Its northern side is bounded by a range of sandstone of considerable height, which runs straight and unbroken from Khoe Namik to the village of Tumbak, and its southern side is bounded by a low sandstone range, which stretches from a spur of Jibbul Dring to the village of Berdistan. Along the northern side of this plain are a few villages and date-trees. There is no place of any size in the plain, but 3 miles south-west from the village of Berdistan, just round the end of the low sandstone range, is Deyer. This is a village of about 100 stone houses and a number of huts. It has a large fort with four towers, two right-angled, one six and the other ten sided. The whole has rather an Oriental appearance. It is governed by a wife of Hyder Khan. The lady is called Fatu; but she has adopted the name of her son Jamil Khan, of Boordakhoon, and uses his seal. She writes, and it is said makes a very good governor, having no objection to show herself to her own people, though she hides her face from strangers. Grain is the chief export of this place, and it is almost all carried in from the surrounding country on camels belonging to Jamil Khan, of Kakee, who has about 1500. This year 200 horses were brought from Shiraz by Khormuj, and embarked here for Bombay, as there is no custom-house. The prosperity of Deyer dates from the destruction of Congoon seven years ago. Berdistan Creek is its harbour. Berdistan village has about fifty stone houses, with a fort built nine years ago by Hyder Khan, on the ruins of a former village, which was destroyed by Sheik Hassan of Gabendie. This same Sheik Hassan also twice burned Deyer. The fort has one or two rooms overloaded with gilding and paintings of women drinking wine. Bussaaf has no river, but a very small stream, called the Paria, comes from the range on the north and loses itself in the plain. The plain of Bussaaf is the

last of the Dashtie country, and on leaving it I got into the Arab districts under Sheik Muscure, of Gabendie, whose district extends from Bussaaf to the government of Hamerun. The population, with the exception of those of Assaloo and Nabend, call themselves Nasri or Nasreah Arabs.

My road now lay along the shore past Congoon, Tumbak, and Tahrie to Nakhli Taki. These villages form a sub-district under Gabendie, with Tahrie, the residence of Sheik Khatham, a younger brother of Sheik Muscure, as the chief town. At Tumbak, or Ayanat as it is called by the Arabs, the sandstone range from Khoe Namik ends by bending round a high limestone range which commences at this place. This limestone range is composed of masses pressed up one against the other so as to form a continuous range, having a general direction east and a little south, and stretching to the north of and past Lingah. Tahrie, said to contain 300 families, looks in a dilapidated state. The chief exports of the place are tobacco and charcoal, brought from the plain of Gillodar, and saltfish from the villages round. To the north of the limestone range behind Tahrie is a fertile plain, called Gillodar, about 60 miles long by 20 broad. It has fifteen stone-built villages, but no river. To the west of that, and separated from it by a low range, is a smaller plain, called Jam. This has a stream which rises in the hills, but is lost in the plain. The inhabitants of these parts are pure Persians, who do not understand a word of Arabic. From Tahrie there is a very good road through the plain of Gillodar, and past the village of Jaharan to Shiraz. A caravan takes eight or nine days.

The plain of Gabendie is bounded on the north by the limestone range which stretches eastward from Tumbak, and on the south by a low range of sandstone extending from Nabend Point along the sea-shore. Khooch Khonar is the largest of the villages, and contains about one hundred families. This is a great flax-producing district, and besides what is consumed in the country round, it supplies most of the fishing villages with material for nets.

Next to Gabendie comes the district of Hamerun. It is bounded on the north by the limestone range, and on the south by the sea. This district is small, and not highly cultivated, but its chief, Sheik Mahomed, besides being a farmer of revenue, is a manufacturer of gunpowder. Sulphur he brings from Bostanah, the saltpetre he gets near Be-de, bringing the crude mass to Hamerun, and there separating the nitrate of potash from the chloride of sodium by crystallisation. The charcoal comes from the hills. He sends all the gunpowder on camels to Lingah—two or three thousand pounds every year.

Bunder Khunderoon, or as it is perhaps as commonly called, from the name of the tribe inhabiting it, Meerazege, is under Lingah. It consists of 3000 houses, divided into many villages, which, hid by date-trees and patches of cultivation, lie round a salt marsh some 50 miles long. The inhabitants are Arabs and Wahabees, though they are not fond of proclaiming the nature of their religion on Persian soil.

It is curious to notice that all through Southern Persia, while the limestone ranges are clothed more or less with the almond, the dwarf oak, the hawthorn, the rose, and the terebinthinae, with springs welling out and little streams running down the hill-sides, the sandstone on the other hand produces scarcely a shrub and barely a grass, and the few streams that spring from it are generally brackish. Again, almost all the masses of limestone have a quaquaversal dip, while the contiguous sandstone has the strike parallel to the limestone range, with the dip away from it, as if the limestone, pushing itself through the sandstone, had raised it also. This is general in the low country, but on the tableland of Persia, where the sandstone and gypsum form hills of considerable height, the strata are as a rule horizontal, as if the upheaval had been sufficiently general to raise them without disturbing their original arrangement.

4. *On the Progress of the Russo-American Telegraph Works.*

(Extract from the 'Journal de St. Petersbourg,' September 28, 1866.)

Nous empruntons des nouvelles qui suivent, sur les travaux du télégraphe russo-américain, à une correspondance adressée de Guigiga à la *Poste du Nord*, sous la date du 2 août dernier :—

"M. Abaza est arrivé à Pétropavlovsk le 8 août, avec trois ingénieurs américains, dont deux, M. M. et le lieutenant Busch, furent immédiatement envoyés à l'Anadyr pour exécuter des travaux d'exploration depuis l'Amour jusqu'à l'Anadyr; M. A. a lui-même entrepris d'explorer, en compagnie du lieutenant Kennan, la presqu'île du Kamschatka, la terre de Koriatsk et le pays de Guigiga.

"Pour se faire une idée des difficultés contre lesquelles les deux détachements ont eu à lutter, il faut savoir que le village d'Oudsk et le port, détruit aujourd'hui, d'Aïan, il n'y a plus de village et Okhotsk, aucun habitant, si ce n'est quelques Tougouses nomades. La traversée du Kamschatka en été, et à cheval, n'a jamais été accomplie par personne.

"Des comptes rendus officiels donneront probablement plus tard des détails sur l'expédition de M. Abaza et de ses compagnons; nous dirons seulement que, malgré les difficultés incroyables qu'ils ont rencontrées à chaque pas, et surtout pendant leur passage à travers la chaîne du grand Tiguilsk, après avoir exécuté ce passage sur des chevaux inaccoutumés au transport des fardeaux, au milieu d'une cruelle tempête qui dura quatre jours, ils arrivèrent dans le village de Tiguil, après avoir accompli en 16 jours, au grand étonnement des habitants, un voyage de 1200 verstes. Nous ne parlons pas des épisodes nombreux de ce voyage, épisodes qui auraient pu se terminer de la façon la plus tragique.

"De Tiguil à Guigiga ils voyagèrent tantôt à cheval, tantôt en baïdars (barques en cuir), sur la baie de Penjinskaïa; enfin, à l'entrée de l'hiver, ils continuèrent leur voyage en traîneaux attelés de rennes et de chiens, traversant les camps des Koriatskes et des Tchoukotskes nomades, et passant souvent la nuit en plein air, et couchés sur la terre, par 35 degrés de froid.

"Le 22 novembre M. Abaza arriva à Guigiga. Là il devait rencontrer le détachement d'ingénieurs qui se proposait de partir des bouches de l'Anadyr pour remonter en bateau cette rivière jusqu'à nos colonies sur l'Anadyr, et de là se rendre en traîneaux attelés de chiens à Guigiga, après avoir exploré le pays des bouches de l'Anadyr à la baie de Penjinskaïa. Cependant, non-seulement M. Abaza ne rencontra pas à Guigiga le détachement de l'Anadyr, mais il ne put en avoir aucune nouvelle; on dut se borner à supposer que les vaisseaux de l'expédition avaient tardé à arriver aux bouches de l'Anadyr, et avaient trouvé le liman de ce fleuve fermé par les glaces, ce qui arrive quelquefois vers le 20 août, et que par suite de ce retard le vapeur de l'Anadyr n'avait pu remonter la fleuve.

"Sans parler même de ce que l'arrivée du détachement de l'Anadyr eût renforcé le nombre des ingénieurs qui devaient faire les explorations nécessaires, M. Abaza comptait recevoir par eux une quantité importante de provisions alimentaires; après son voyage de Kamschatka les siennes étaient épuisées. Mais par dessus tout il aurait voulu connaître l'issue de l'expédition de l'ingénieur en chef, M. Bulkley, au détroit de Behring.

"En tardant à arriver au point marqué, le détachement de l'Anadyr laissait entre les mains de quatre hommes, dont deux étaient sur l'Amour, tout le travail de l'étude et de la démarcation de la ligne suivant laquelle le télégraphe devait être construit, sur une étendue de 6000 verstes.

"A tout ce qui rendait ainsi assez difficile la position de M. Abaza et de ses compagnons venait s'ajouter l'incertitude où ils étaient par rapport au détache-

ment de l'Anadyr. Le détachement avait-il débarqué à l'embouchure de l'Anadyr, et comment avait-il été accueilli par les Tchouktchis, cette race sauvage et belliqueuse qui occupe une immense étendue à l'extrémité nord-est de la Sibérie? Bien que les Tchouktchis, que M. Abaza avait rencontrés à son passage dans la terre des Koriatskes l'eussent assuré du caractère pacifique (toutefois très-sujet à caution) de ceux de leur race, il était très-désireux de savoir dans quelle situation se trouvait le détachement, dans le cas de leur débarquement aux bouches de l'Anadyr.

"Bien que le débarquement des Américains, dans une saison avancée, ne nous parût pas probable, M. Abaza, qui connaissait le personnel de l'expédition, l'esprit entreprenant et énergique de l'ingénieur en chef, ne douta pas que le colonel Bulaley n'eût risqué de laisser quelques hommes à l'embouchure de l'Anadyr; le lieutenant Kennan fut envoyé avec quelques esquimes et quelques indigènes à la colonie d'Anadyrsk, pour recueillir des renseignements à ce sujet et continuer les travaux d'étude pour l'établissement du télégraphe.

"En même temps M. Abaza partit dans la direction d'Okhotsk et d'Aïana, pour frayer la voie par la chaîne du Stanovci, et résoudre cette question essentielle pour la compagnie: fallait-il établir le télégraphe d'Okhotsk à l'Amour par la terre ferme, le long des bords de la mer d'Okhotsk, à travers des localités qui jusqu'à ce jour n'ont été explorées par personne, ou établir sur cette étendue un câble sous-marin.

"Nous avons déjà dit que nous ne pouvions entrer dans tous les détails de la marche de l'expédition, et nous dirons seulement ici qu'entre Okhotsk et Aïana le chef de l'expédition rencontra le capitaine Meyhood et le lieutenant Busch, envoyés de Pétrópavlovsk sur l'Amour. Ces ingénieurs et M. Schwartz avaient fait la route de Nicolaïevsk à Okhotsk accompagnés de Toungouses, et montés sur des rennes, et malgré ce moyen de transport horriblement fatigant, et leur voyage à travers des localités peu connues même des nomades, ils avaient réussi à remplir de la façon la plus satisfaisante la mission qui leur avait été confiée.

"Cependant le lieutenant Kennan apprit par des nomades, entre Guigiga et Anadyrsk, que sur la fin de l'automne deux navires, l'un à voile et l'autre 'de feu,' étaient arrivés à l'embouchure de l'Anadyr, et y avaient débarqué cinq hommes, qui y vivaient dans une hutte munie d'un râble. On leur avait fournis d'une quantité suffisante de provisions, et que, à l'exception de cela, les Tchouktchis leur avaient promis de les transporter par le premier traînage à Anadyrsk. Pourquoi ne l'avaient-ils pas fait? on ne le savait pas.

"Aussitôt après son arrivée à Anadyrsk, le lieutenant Kennan partit, en traîneau attelé de chiens, pour les bouches de l'Anadyr, afin d'aller à la recherche de ses compagnons, et fit le premier cette route en hiver avec des chiens. L'été nos missionnaires s'y rendent souvent d'Anadyrsk par mer, pour y prêcher l'évangile; mais personne n'y a encore été l'hiver.

"D'Anadyrsk à l'embouchure du fleuve il y a 600 verstes, et pour faire le voyage aller et retour on est obligé de se servir des mêmes chiens, et encore d'emporter avec soi de la nourriture pour ces animaux (du poisson séché); il est impossible d'en prendre avec soi pour plus d'un mois, et, si dans cet espace de temps on ne parvient pas à revenir et à éviter les horribles tourbillons de neige, qui durent quelquefois pendant plusieurs semaines,—ce qui fait qu'il n'y a alors aucune possibilité de voyager, et que la nourriture des chiens s'épuise, —alors le voyageur n'aurait plus de secours à espérer, et une mort inévitable l'attendrait.

"Le lieutenant Kennan atteignit très-heureusement le lieu de débarquement des Américains, et ramena à Anadyrsk, avec tous leurs effets et toutes leurs provisions, les trois ingénieurs, qui vivaient dans une cabane bien organisée. Avant l'arrivée du lieutenant Kennan deux Américains étaient partis avec un parti de Tchouktchis, et n'étaient arrivés à Anadyrsk qu'en 64 jours. Nous

espérons que ces voyageurs s'empresseront de communiquer au public des détails sur leur long séjour au milieu des nomades, d'autant plus qu'excepté le capitaine Billings, qui a été vers 1780 à la terre de Tchoukhotsk, personne n'a jamais pénétré dans cette contrée.

"Maintenant le chef de l'expédition est revenu de ses excursions lointaines, et a terminé ses travaux. Les travaux d'études sont entièrement achevés depuis Anadyrsk jusqu'à l'Amour, sur une étendue de 6000 verstes, et la direction de la ligne du télégraphe est arrêtée. Cet immense travail a été exécuté par le chef de l'expédition et trois ingénieurs, dans le courant d'un hiver horrible, durant lequel ils eurent à lutter contre d'incroyables difficultés, voyageant chaque jour à travers des déserts, tantôt à dos de rennes, tantôt avec des chiens, le plus souvent simplement sur des raquettes, et toujours avec de cruels ouragans et des froids affreux pour compagnons.

"Quand la mer d'Okhotsk sera libre, nous attendons ici l'arrivée de navires de la compagnie télégraphique, venant d'Amérique avec tout le matériel nécessaire pour commencer immédiatement les travaux. Ces navires nous amèneront des Yakoutes déjà loués pour les travaux, et ceux-ci seront poursuivis activement de l'Amour à la mer de Behring. Déjà maintenant, depuis Okhotsk jusqu'à Anadyrsk, les travaux sont commencés, avec le concours des habitants; ces travaux consistent à construire des maisons, à équarrir des arbres pour faire des poteaux télégraphiques, etc.

"Si l'on tient compte de l'activité persévérante et infatigable des constructeurs en chef du télégraphe russo-américain, on peut s'attendre à ce que d'ici à trois ans tous les travaux soient terminés, et à ce que nous, habitants de Guigiga, nous puissions féliciter par le nouveau télégraphe, non-seulement nos compatriotes d'au-delà de l'Oural, mais nos voisins d'outre-mer, de la fin de ce pénible et magnifique travail."

5. On the Routes between Orenburg and Tashkend.

(Extract from the 'Gazette de Moscou'.)

"En partant d'Orenbourg pour se diriger vers les frontières de la Tartarie indépendante on rencontre le long de la route jusqu'à Orsk, sur une étendue de 280 verstes environ, les *stanitzas* très-bien construites des cosaques d'Orenbourg. A Orsk on quitte l'Oural et l'on entre dans la steppe des Kirghiz d'Orenbourg. Le premier point qu'on rencontre sur la route est la forteresse de Karaboutak, près de la petite rivière du même nom, que se jette dans la rivière Or. Cette forteresse, qui se trouve sur un rocher élevé, ressemble à un vieux château. Près d'elle se trouve un petit village russe. Plus loin on arrive à la forteresse Ouralsky, sur la rivière Irghiz, puis de là, à travers le Karakouma, au fort No. 1 (Kazala), et du fort No. 1 au fort No. 2 (Karnakrebi), distant de 187 verstes du fort Pérovsky. De ce dernier point la route de Tachkent passe par la forteresse de Djioulek, par Iani-Kourgan (renversée par nous en 1861) et Turkestan, et à partir de là elle se prolonge et se change en un joli chemin coupé par de fréquents cours d'eau qui descendent du Karataou pour se jeter dans le Syr.

"Ainsi, depuis Orsk, jusqu'à la forteresse d'Ouralsky, on suit presque constamment la rive de l'Or. Des compagnies innombrables de perdrix blanches volent auprès de vous comme si elles vous poursuivaient. De la forteresse d'Ouralsky on entre dans le Karakouma, et là on fait 400 verstes à travers les sables de la steppe aride et inhabitée, dans laquelle on rencontre des puits aux stations, dont l'eau est amère et salée.

"On rencontre la mer d'Aral à deux journées de marche avant d'arriver à Kazala, à la baie de Maïli-Bach, et on la voit de loin; là on rencontre quelque

végétation, mais pauvre. A partir de Kazala, on a pour compagnon de route le Syr-Daria. Tantôt en s'en rapprochant, tantôt en s'en éloignant, on suit sans la quitter la direction de cette rivière jusqu'au fort Pérovsky, sur une distance de plus de 400 verstes.

"La marche d'un chameau chargé est ordinairement de 4 à 4½ verstes à l'heure; les intervalles des stations sont calculés dans la steppe de façon à ce que l'on ne marche point pendant la grande chaleur, avant le crépuscule on se met en route et l'on fait une seule étape jusqu'à dix heures du matin. A cinq heures après midi on repart de nouveau, et à onze heures on s'arrête pour passer la nuit. C'est ainsi que l'on fait des marches de plus de douze heures par jour et que l'on franchit à dos de chameau un espace qui n'est pas moins de 60 verstes.

"Ce genre de monture n'est pas employé partout, mais à deux stations entre le Karaboutak et la forteresse Guralsky, et quelquefois, en cas de nécessité, dans tout le Karakouma. Y compris les temps d'arrêt, on parcourt toute cette distance en six jours, et le septième au matin on arrive à Kazala, d'où l'on parvient en quatre jours au fort Pérovsky. Du reste, les relais de poste sont depuis longtemps organisés depuis Orsk jusqu'à Kazala; ils sont entretenus par les Kirghiz, et si ces derniers ne sont pas encore familiarisés avec le mode d'attelage russe, en revanche ils mènent vite. Dans le Karakouma, ils se servent le plus souvent d'attelages de chevaux.

"L'ancien gouverneur-général d'Orenbourg, M. l'aide-de-camp général Bézack, a prescrit qu'à chaque station il y aurait un postillon russe pour familiariser plus promptement les Kirghiz avec le service russe des postes."

6. *Last Letter of Mr. DUNCAN MCINTYRE, Leader of the Leichhardt Search Expedition, and an Account of his Death.*

(Communicated by the COLONIAL OFFICE.)

SUBJOINED is an extract from the last despatch of Mr. McIntyre to his uncle, D. Campbell, Esq., and also a despatch from the second in command:—

"Gregory River, 2nd May, 1866.

"I wrote you about five weeks ago from the Gilliot River, sending a lot of accounts and other papers connected with the expedition. The dromedaries, horses, and men needed rest for a few weeks. I got another man, named McLeod, and two of the black boys Donald [McIntyre, the explorer's brother], brought over with the cattle and seven horses. On the 2nd April I started in search of further traces of Leichhardt, and also to call at the port to get some more rations.

"Nothing of any consequence happened during the first week. We passed over splendid country all the way, until we entered the watershed of the Leichhardt River; the country there became rough and stony. It took us nearly a week, going straight west, before we got to the main branch, which we crossed and kept west for one day more. The country then was all but impassable; our horses not being shod could not stand it, so we had to turn eastward again to the main channel of the Leichhardt, which we followed down in three days, when we reached the settled districts, Kennedy and McDonald being the farthest out on the Leichhardt. We still kept the river until we passed the next station, 40 miles lower down; we then left it, and struck out north-west, and in about 50 miles arrived at T. G. McDonald's station on the Gregory. Here we were informed of the unhealthiness of the

climate, a man having died a few days before our arrival; his grave was quite close to the bit of a shed they called a hut. There being only two on the station, the survivor was unable to carry his unfortunate companion to any distance. We kept on down the river, and in due time arrived at what is called the township [Burketown] or port. The population was about sixty, forty-five or fifty being bad with the fever; in fact, people were sick everywhere. I could not count ten able to do anything in the shape of work. I camped at a lagoon about a mile from the town [Burketown], thinking that I was away from all the sickness. There were two tents near us. Next morning one of the men in the tents was dead; and, on going up to the township to get the stores away, I was told two more had died that morning. I got my stores and started up here, 16 miles higher up. While putting them into order for packing on the horses, one of the black boys got the fever, and this morning McLeod has it. The black boy, I think, will get over it; but McLeod thinks it is all over with him. I am all ready, only waiting for the men to get well. I hope in a few days they will get better; it does not last long, in a week one is either in one's grave or well again.

"Before I came here there were about eighty in the town, sixty-six of whom were bad with fever. I am told that twenty-five are all that have died in the town, and they are making up coffins for two more, who are past recovery. I hope I shall get away all right; people are leaving by sea and land, as fast as they can. There are two stores; flour, tea, and sugar in abundance, but of very bad quality—the flour we can hardly eat, as it is quite sour; and there are two public-houses. The present site of the town is on a plain only a few feet above the level of the sea.

"Perhaps there is something unusual in the atmosphere this season; but the natives of the country appear to be all right.

"We have met with no positive trace of Leichhardt yet; but we have ascertained beyond a doubt that whites are now, or have been, among the blacks within the last ten years. There is a boy and a girl, from ten to twelve years of age, almost white, with light blue eyes and red hair; and in another tribe, a girl about fifteen years of age; and in another a full-grown woman, perhaps eighteen years of age; and there is a rumour of a white man being within a day's ride of this, among a strong tribe of about two hundred; they are very fierce; none of the settlers have come to any terms with them yet. They will come out on the open plain, and fight to the last. I have been after this supposed white man already. I was accompanied by the officer in charge of the native police here; he had two troopers with him, I had also a black boy. We saw between thirty and forty blacks; but there was no sign of white men among them. We had to make prisoners of them all before they would allow us to see them properly. In order to have an interpreter, we took a young fellow with us to the police camp. He is now quite at home; in three or four months he will be able to speak a little English, when, if not before, we shall learn all about how the half-castes came among the blacks.

"The blacks are now all collected near the sea-coast between the Albert and Leichhardt rivers, with the white man or half-caste among them. They are said to be well armed, and give chase to all the whites that approach them. This, of course, I do not believe.

"I know they are mostly very bold, and stout able fellows. One of them nearly took the carbine from the officer, when we were out the other day. They have no fear whatever of fire-arms. As soon as I can get away to-morrow, or next day, perhaps, I intend going to where the blacks are, and camp somewhere there, until I find out all about who the white man is, or whether he is only a half-caste; but I am sure there is something in it. However, I shall learn about it in a few days. I think the officer and native police will go with me, as there is only myself and one black boy able to do

anything, and two are not enough to surround one hundred or more blacks, and disarm them, whereas five or six can do so without shooting any.

"We were camped for nearly two months among 600 blacks at Cooper's Creek. They were at times very troublesome, but we never had to shoot any, although they richly deserved it sometimes. We saw no blacks until we reached the tropics. We had no trouble with them. On this expedition we saw a good many, and traces of large tribes every day, especially at the head of the Leichhardt. We could get no information from any we saw, and had great trouble in getting near them; but once up to them they always considered themselves prisoners; I suppose from some custom among themselves. They are cannibals here and all the way up the east coast. I have seen no positive proof of their eating one another, but they have the same habits as those that are further eastward. I have had no time to examine many camps yet; those which I have searched contained nothing but what all wild blacks have: no sign of iron or any metal in any shape. The head of the Leichhardt, and also the western branches of the Flinders River, are a great harbour for blacks. They contain so many mountain passes, that a few natives could defend them against a regiment of soldiers. Mountains perpendicular for 600 and 800 feet, in some places narrower above than below [the mountain passes]. Except in the beds of the watercourses the country is quite impassable for anything; but a man without boots or shoes might, like a black fellow, get up one ravine and down another.

"It requires one to be very cautious in travelling through a country of this description, to avoid being surprised by natives or having one's retreat cut off: one great advantage, however, [exists] in the abundance of permanent water everywhere, but food is often scarce. Since leaving the depot camp on the Gilliot we have explored about 500 miles of new country, mostly along the northern face of the coast mountains. We passed over what, I have no doubt, will prove to be a rich gold field before long. We did not find any gold; but from the character of the country I have not the least doubt of its existence: should the search in this neighbourhood be unsuccessful we shall cross the coast range immediately, and continue the search on the southern or inland waters about south-west towards Swan River.

"DUNCAN M'INTYRE."

The letter is written in ink, the signature in pencil. It was evidently left uncompleted. The words in brackets have been added by Dr. Mueller.

"The Hon. Secretaries, Ladies' Leichhardt Search Committee, Melbourne, Victoria.

"LADIES,

*"Leichhardt Expedition. Camp. River Gilliot,
7th June, 1866.*

"It is with feelings of the deepest sorrow that I beg to communicate to you the melancholy intelligence of the death of our leader, Mr. Duncan M'Intyre, which occurred on the morning of the 4th inst., at his brother's camp on the River Gilliot.

"I will endeavour, as clearly as I can, to narrate the circumstances immediately preceding and attending his death, feeling convinced that they will be of the most painful interest.

"Mr. M'Intyre, accompanied by Archibald M'Leod and two black boys, left this camp on the 3rd April, and proceeded in a direction slightly to the northward of west to the River Leichhardt. As he has since informed me, after perfectly convincing himself that Leichhardt could not by any possible chance

have taken his party over the country he saw there, he travelled generally in a north direction, following the river down to $18^{\circ} 56'$ s. lat. Here he left the Leichhardt and struck across for the Gregory on his way to the township on the Albert River, where he purposed buying horses and rations. He arrived at Mr. J. G. M'Donald's station on the Gregory on the 18th April. The next day, following the river down, M'Leod, who was leading the horse which carried the party, missed Mr. M'Intyre's track, and he and the black boys were in consequence without food of any sort excepting one ignana until they arrived at the Landsborough River Company's station on Bean's Brook on the evening of the 20th. Near this station he camped till the 4th May, making such visits to the Albert River township, distant 16 miles, as business required. At this time a disease generally known there as "the fever" was raging in the township, and M'Leod and M'Loughlin, who entered the service of the expedition there, as well as the two black boys (one of whom has since died from its effects), were attacked by it. Mr. M'Intyre apparently escaped; but he afterwards, on the 13th May, told me that on one occasion he had feared he had caught it, but was determined to, and did, shake it off. On the 20th May we (I had in the mean time joined the party) arrived at the River Dugald, where Mr. M'Intyre resolved to leave us while he and one black boy proceeded to the Gilliot, distant 50 miles east from the former river, to bring the other portion of the expedition to us. Up to this time he had been by far the strongest man amongst us. Next morning he felt unwell, and having lain in the smoke which arose from a hollow damp log on the fire during the night. Next day he was still unwell; but on Wednesday, 23rd May, he started for the Gilliot, intending to be back in about a week. I did not again see him alive.

"The dromedaries, &c., arrived at the camp on the Dugald on the 29th May; and by that opportunity Mr. M'Intyre forwarded me a note of instructions, informing me therein that owing to extreme weakness he had been unable to reach the Gilliot on the same day he left us, but that he arrived there the next morning in a very exhausted state. He also said then (26th May) that he felt better, and hoped to rejoin us in a few days.

Late in the evening of the 2nd June, I received a note from Mr. Donald M'Intyre, stating that his brother was very ill: and as he would not, in all probability, be able to start with the expedition for some weeks, I was instructed to return with the entire party to the Gilliot.

"The 3rd June was occupied in mustering the horses and preparing for a start out, which we made the next morning.

"On the 5th June, when about 26 miles from the Gilliot, I was met by a messenger bearing the sad tidings that our leader was no more. I of course, immediately pushed forward, arrived at the camp in the evening, and learnt that during the last two days of his life he had been speechless and without the slightest power of motion. Occasionally he suffered very severe pain, while at other times he was in comparative ease. At six o'clock on the morning of the 4th he gently breathed his last. He had expressed a wish, some days previous to his death, that I should read the funeral service over his remains; and I need hardly assure you his desire was religiously respected. We buried him on the morning of the 6th June.

"How severe was his disappointment at not being permitted to finish the great task he had undertaken few can imagine. Rumours which, although utterly groundless, had been widely spread, to the effect that he had accepted the post of leader of this expedition simply with a view to benefit himself and not to achieve its grand object, had reached his ears and had grieved him exceedingly. He had every confidence, however, that he would thoroughly succeed in the performance of his duty, and he refused so base a scandal. On several occasions he mentioned it, and once added, 'It's no use

telling them they're wrong; I'll show them.' But this he has not been allowed to do. In his last letter of instructions to myself, which he had dictated to his brother, he said, 'all those who have travelled with me will be able to give evidence if I adhered to the terms of the agreement to really search for Leichhardt while a horse or a camel remained of the expedition.' That he did so, and would have continued to do so, none who knew him can doubt.

"W. F. SLOMAN, Second in Command."

7. *On the result of Mr. McKinlay's Exploration in search of Lands suitable for Settlement in the neighbourhood of Adam Bay, in Northern Australia.* Extract of a Despatch from Sir D. DALY, Governor of South Australia, to Lord CARNARVON, dated 27th September, 1866.

(Communicated by the COLONIAL OFFICE.)

"THE arrival yesterday of the schooner *Beatrice* from Adam Bay, with Master Howard, R.N., and the survey party, has furnished me with dates from that quarter to the 14th August.

"Mr. McKinlay, with two of his exploring party, have also returned in the *Beatrice*.

"No deaths had occurred in the settlement, and all were in good health; but I regret to say that with the mention of these fortunate circumstances ends everything favourable that can be reported of the prospects of the Adam Bay Settlement, which I fear must be considered a complete failure.

"Time does not permit my giving your Lordship full details of the causes of McKinlay's want of success, in the discovery of lands more suitable for settlement than Escape Cliffs. After having lived upon horse-flesh as long as that source of supply lasted, he constructed a kind of boat, partly with the horses' skins, in which he and his party managed with great difficulty to return by the coast to Adam Bay.

"Mr. Howard's Report, of which I have the honour to enclose printed copies,* shall be accompanied by any further particulars that can be supplied by this mail; but full details shall be transmitted by the next, by which time I shall likewise probably be able to inform your Lordship of the final intentions of my Government in regard to this first unfortunate effort by the colony to settle the Far North.

"At present the intention is to despatch a vessel immediately to bring back the remainder of the party with all their effects, and for the time, at least, to abandon all further efforts at settlement in that quarter."

* Mr. Howard's Report will be printed in the Journal of the R.G.S.

- PROCEEDINGS
OF
THE ROYAL GEOGRAPHICAL SOCIETY.

[ISSUED APRIL 10TH, 1867.]

SESSION 1866-7.

Fourth Meeting, January 14th, 1867.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in
the Chair.

PRESENTATION.—*Capt. J. B. Caldebeck.*

ELECTIONS.—*Thomas Black, Esq.; Robert Brown, Esq.; Capt. George Ernest Bulger, F.R.S., &c.; Michael G. Graham, Esq., M.D.; O'Dell Travers Hill, Esq.; William B. Lambert, Esq., C.E.; David Maccloughlin, Esq., M.D., ETC.; Lawrence Oliphant, Esq. (of Coudie, Perthshire); William Henry Potter, Esq.*

ACCESSIONS TO THE LIBRARY SINCE THE LAST MEETING. *Donations.*—Maillet's 'Description of Egypt.' Hague, 1740. 'Climat de St. Reno,' Dr. Daubeny. 'Lettres sur la Morée et les Isles de Cerigo,' par Castellan. 'Reisebeschreibungen für die Jugend,' by J. H. Campe. 'Nurnberg,' von Dr. F. Maher; 'Nurnberg,' von J. F. Roth (Guide-books). 'Prag,' von Dr. L. Alucklessig. Lindau's 'Sacher-schen Schweiz.' Körber's 'Fremdenführer in Frankische Schweiz.' Julin's 'Semmering und Reichenau Führer.' Müller's 'Aachen und Umgebungen.' Cutler's 'Spa and its Mineral Springs.' Geuth's 'Iron Waters of Schwalbach in Nassau.' Hoser's von 'Franzens-brun bey Eger.' Eger & Elster, 'Marienbad, Carlsbad,' etc. Herrlein's 'Aschaffenburg.' Polak's 'Ischal Guide.' Tylor's 'His-torical Tour in Franconia.' 'Guide to the Grand Chartreuse.' 'Guide to Chartreuse de Pavia.' Miss Pardoe's 'Chartreuse.' 'Guide al Sacro Monte di Varallo.' All presented by S. M. Drach, Esq., F.R.G.S. 'Ricordi di un Viaggio in Oriente.' Rome, 1866. 'Diffu-sione Geographia.' Rome, 1862. 'Di Clima di Gondogoro.'

Rome, 1861. 'Sulla Scoperta delle Origini del Nilo.' 1864. All presented by the author, M. Nardi. 'On the use of Petroleum for Locomotives.' 'Ueber das Zeitalter des Geographen Eudoxus des Astronomen Gemios.' 'Ueber die antiken Namen und die Geographie der Baumwolle im Alterthum.' 'Report on the visits of Lieut.-Colonel Merewether, c.b., to places between Aden and Suez.' Wilson's 3rd volume of 'Imperial Gazetteer of England and Wales.' Portfolio from Cassel, 'Theoretisch-Practische Schule des Situationszeichnens.' A manuscript, 'Appertenant à l'Ouvrage de Cialdi, sur les Movements de la Mer et ses Effets,' pages 535-57. Cialdi, 'Sul Moto Ondoso del Mare.' Cialdi, 'Ports Canaux.' Baer, St. Petersburg, 'Der Haut Gefunden Mammuths, und die zur Vergung desselben ausgerüstete Expedition.' A manuscript, 'Australia formerly a Satellite to the Earth; a Philosophical Treatise on the Earth and its Satellites,' by W. Watson, Sydney, Australia. 'Cathay, and the way thither.' Hakluyt Society. Bailliver's 'New South Wales Gazetteer and Road Guide.' By the Government of New South Wales. 'Descriptive Notes on Peking; with a large Map compiled from native authorities. By Henry Kopsch and Edg. Tainor. 'Physical Geography,' by Ansted. 1867. 'The Elements; an Investigation of the Forces determining the Position of the Ocean.' By Jordan (W. L.). Loffter's 'Forsog paa en Geonostic,' etc. Malte-Brun's 'Resumé Historique et Geographique de l'Exploration de Gerhard Rohlfs, au Zouât et à In-Calâh.' 'The Alps of Hannibal,' by Wm. J. Law, M.A., F.R.G.S. Presented by the Author.

Purchased.—'Amerigo Vespucci, son Caractère,' etc. 'La Florida del Inca,' by de la Vega. 'Chronologico para la Historia de Florida.' 'Principles of Geology,' by Sir C. Lyell. 'Die Insel Cypren.' 'Der Niger der Alten.' 'Die Preussische Expedition nach Ost-Asien.'

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING.—Maps of the Ordnance Survey of Great Britain, 346 in number. Presented by the Ordnance Survey Office, Southampton, through Sir H. James, R.E., Director. Map of Central Asia, by Lieutenant-Colonel J. T. Walker, from British and Russian authorities. Presented by C. R. Markham, Esq., Secretary. Map of the Island of Java, showing the political divisions and volcanoes, by Dr. A. Petermann. Map of the River San Francisco (Brazil), by Eml. Liais, Esq. Presented by Dr. A. Petermann. A Map of London, showing the Metropolitan Railways and Miscellaneous Improvements to 1867. By E. Stanford, Esq. Presented by the author. Map of Equatorial Africa, illustrating M. du Chaillu's Routes in 1864-5. Presented by M. du Chaillu. River Volta and country adjacent, by Chr. Hornberger,

&c. Presented by Dr. A. Petermann, 1867. Map of the Marquesas Islands, Pacific Ocean. Presented by Dr. A. Petermann. Map of the Sudden-Gebietes, near Ortler, the Rhetian Alps. Presented by Dr. A. Petermann.

The following Papers were read :—

1. *Notes of a Journey from Bida, in Nupe, to Kano, in Hausa, performed in 1862 by Dr. W. B. BAIKIE, R.N. Extracted from portions of Dr. Baikie's Journals in possession of the Foreign Office.* By J. KIRK, Esq., M.D., F.R.G.S.

(Communicated by the FOREIGN OFFICE.)

DR. BAIKIE left Lukoja, the British settlement formed by him opposite the confluence of the Binuwe and the Niger, in December, 1861, on a journey to Hausa, to recover the papers of Dr. Vogel and other travellers. He remained at Bida, the capital of Nupe, until the month of April following, and then set out on his march in a north-easterly direction towards Kano. On his journey he passed through several towns of considerable population, the inhabitants of which spoke the Hausa language. On the fifteenth day of the march (April 28th) his party entered the country of Zariya, and on the 30th reached the capital of that district, which is one of the great centres of commerce of Hausa. The silk-cotton trees which surround the town make its site conspicuous in the midst of the plain; there are upwards of 1000 of these trees, varying from 50 to 70 feet in height. The height of the plain above the sea is 2000 feet, and rivers drain it to the Kaduna and thence to the Kwora. On the 26th May Dr. Baikie left Zariya, diverging from his route to visit the King at his war-camp, and resuming his north-easterly course on the 18th of June. On the 29th, having left the town of Antsan; they found the streams flowing in an opposite direction, to pass round Bebeji and join one of the affluents of Lake Tshad: after crossing several of these streams the party reached Kano on the 2nd July. He was well received by the King, who was at his war-camp in the south-easterly part of his dominions, and all the papers of the European travellers were ordered to be delivered up to him; but it now appeared that the greater part were at Zinder, whither they had been taken by the Azhenawa after the murder of Corporal Maguire. The paper concluded with tables of routes and barometric observations, and lists of the Kings of Zariya and Kano. It will be printed *in extenso* in the 'Journal,' vol. xxxvii.

The PRESIDENT said the thanks of the Society were due to the Foreign Office for communicating this abstract of the late Dr. Baikie's journey, undertaken in the course of his mission to Africa. It would also ask the meeting to return their thanks to Dr. Kirk, the companion of Livingstone, for having prepared this excellent abstract, from the voluminous docu-

ments which Dr. Baikie had left behind him. He (the President) had a strong personal interest in the labours of Dr. Baikie, because he was President of the Society at the time the expedition to the Niger was decided upon. He wrote to his lamented friend, Sir John Richardson, the eminent naturalist, then the head of the Medical Department of the Naval Establishment near Portsmouth and Dr. Baikie, who was a young assistant-surgeon under him, at once volunteered for this special and most dangerous service. Dr. Baikie was wrecked in the steamer the *Day Spring* in ascending the Niger in 1857, and showed his fertility of resource in establishing his party in camp on the shore, saving what they could from the vessel, and cultivating relations with the neighbouring chiefs, especially with the Sultan of Sakatu; thus supporting the party in this position until another steamer arrived from England. Dr. Baikie passed seven years in that region, and, under the auspices of Her Majesty's Government, established at Lukoja a station, with the object of opening up commercial relations with the intelligent chiefs of the neighbouring country, and he had advanced a considerable way in producing the best feeling and harmony between the native tribes and the British establishment. Now, when he told them that he had the authority of Commodore Wilmot, the late Commander of our naval forces upon that coast, for stating that this station had attained a degree of usefulness that was highly creditable to the British nation, they would willingly offer their tribute of admiration to the devotion of Dr. Baikie. After passing through all the trials incident to a long residence in that country, he was, on his return home, at Sierra Leone, suddenly seized with fever and carried off. He, the President, had most willingly signed a petition now before the Lords of the Treasury in favour of the relatives of Dr. Baikie, who, he was sorry to state, were left in bad circumstances.

MR. TRELAWNEY SAUNDERS said he should be sorry if the paper of his lamented friend, Dr. Baikie, were read without remark. There must be many who had a kindly remembrance of him, a most genial man, learned and well-informed; and he had added very considerably to our knowledge of Africa. It was through his voyage on the Chadda that he first became known as a geographer. It was then almost a new river to us, and it was through his labours that we became so well acquainted with its course. It appeared by the present paper that he had visited another new river, the Kaduna. This journey was through a country lying between the course Clapperton took on the north, and that which Lander took in his attempt to reach the Niger after Clapperton's death; so that it was a welcome addition to our geographical knowledge. This great interior country was an elevated region, possessing large towns, forests, and a climate suitable to Europeans. The death of Dr. Baikie was the more to be deplored from the circumstance that he appeared to have left no one to succeed him as the apostle of African exploration in the Soudan. If Africa is ever to be civilised, it is to the Soudan that we must look as the chief seat of any movement for that purpose. It was the seat of a great commerce and of a great population. It contained also the largest Mohamedan empires in Negroland, the Fellatah territories extending from the coast nearly half across the continent, thus affording some proof of the capability of the Negro for organisation. He should be proud to see the day when some combination, like the East India Company, would take a strong hold of Africa, and deal with the natives as we had done in India.

2. *A Visit to Vohimarina, the North-East Province of Madagascar.* By the BISHOP of MAURITIUS.

THIS province, called Vohimare by Europeans, is on the whole mountainous, but it possesses, along the courses of its rivers, large

and fertile valleys, which present every advantage for colonization : they might be made to grow all kinds of tropical produce, and the woods, especially those around the Bay of Diego Suarez, abound with excellent timber. It is only the neighbourhood of the Bays of Vohimare and Diego Suarez that the country is inhabited, the interior being peopled only by wild oxen and a few scattered hunters who are employed in their chase. The indigenous population is composed of Sacalavas and Betsimsarakas ; the dominant Hovas have a few ill-built forts at some distance from the sea-shores. The houses of the Betsimsarakas are very clean and neat, much more so than those of the Hovas or Sacalavas. This the author thought might be attributed to their intercourse with Europeans. The beautifully fair countenances and the partly European features of some of them, and the many foreign tombs at Vohimare and elsewhere, lead to the supposition that many Europeans (some say old pirates) settled on the east coast of Madagascar and married native women. The bullocks of Vohimare, owing to the superior pasture, are the best in Madagascar, and fetch a higher price at Mauritius than any others. The paper gave some detailed information concerning the valleys, rivers, and forests of this part of Madagascar, and also contained extracts from the diary of the author kept during a journey in the province, in September 1865. It will be printed entire in the 'Journal,' vol. xxxvii.

The PRESIDENT in returning thanks to the author, said that those who had read the interesting work of Mr. Ellis the missionary, would recollect that very little was known respecting this fertile tract of north-eastern Madagascar. He thought it was highly to the credit of a bishop of our Church that he should have gone through this region and given us so good a description of it.

Mr. J. CRAWFORD said they were greatly obliged to the Bishop of Mauritius for the account he had given of this little-known part of Madagascar. The people of Madagascar, especially the Hovas, seemed on the whole to be in a better position and in a higher state of civilisation than the people of Africa generally, more particularly on the east coast. They owed this to an accidental and hitherto unexplained intercourse which they formerly had with the Malays, a race inhabiting a region 3000 miles distant. How the Malays got to Madagascar he would not venture to say. But the Malay language was there, as he had before had occasion to observe at meetings of the Society. He had counted at least 150 Malay words, very clearly to be distinguished from the common language of the country, these including the whole of their numerals up to one thousand. The Africans on the continent generally counted up to ten, very rarely up to one hundred ; but here were the complete numerals of the Malay, up to one thousand. The names for many things, such as rice, the yam, &c., were Malayan. Still they were essentially African negroes, a very indocile and unimprovable race. With their many advantages they ought to have made greater progress. They possessed the horse, ox, and the hog, with rice, yams, millet, maize. Supposing the Maories possessed all these, what a people they would have been ! what a superior genius they displayed as compared with these Africans ! He did not at all agree with the advice of

Mr. Saunders, that we should lay a strong hold of Africa. He did not know what we could lay a strong hold of except sheer barbarism. He knew what would lay a strong hold of us, and that was malaria. These regions were not fit for colonisation by Europeans, because they were almost entirely tropical. The very description which gave of the plague of mosquitoes was enough to keep Europeans out of Madagascar. With regard to the civilisation of Africa, it was very clear that almost all the civilisation which the Africans had received had been derived from foreign quarters. It was mortifying to us to think that it was the Arabs and the Mohamedan religion that had improved the Africans. Wherever they happened to be converted to Mohamedanism, they were sure to be more civilised than when they remained mere pagans; better clothed, better fed, and more humanised, giving up those horrible rites which characterised the native religion.

3. *Diary of a Hill-Trip on the borders of Arracan.* By LIEUTENANT
T. H. LEWIN.

THIS paper consisted of extracts from a report, by the author, of a hazardous journey he and his party had recently performed, in the course of their police duty, amongst the wild hill-tribes of the borders of Bengal, Arracan, and Burmah. The diary commences on the 15th November, 1865, and terminates with the arrival of the author at Chittagong on the 11th February, 1866, after a narrow escape from a hostile party of the Shindoo tribe, who forced them to take refuge for two nights in the jungle.

MR. CRAWFORD explained that this paper was a portion of the diary of one of a number of officers called "Superintendents of Police" on the eastern frontiers of Bengal, where the two large tribes, the Hindoo and the Mongolian, meet. Lieutenant Lewin's diary, which he read towards the conclusion of the paper, gave an interesting account of his adventurous attempt to penetrate the territory of these wild tribes. Between Burmah Proper and Pegu lies a district peopled by the Arracanese and a number of other tribes, all speaking different languages. In attempting to penetrate into the country, Lieutenant Lewin and Lieutenant Monro and their party were surrounded and pursued, and they saved their lives with the utmost difficulty and with the loss of all their property.

The PRESIDENT, in expressing the thanks of the Society for this communication, said Lieutenant Lewin had displayed in this journey that gallantry common to British explorers, of which they were much accustomed to hear in the rooms of the Geographical Society.

Before the conclusion of the meeting the President announced that the Council had that day voted a further grant of 50*l.* towards the expenses of Mr. Gerhard Rohlfs' journey in Central Northern Africa. This adventurous young German, a native of Bremen, had succeeded in penetrating alone, from Tripoli to Kuka, on the shores of Lake Tshad, whence he had written to the Society announcing his intention of proceeding at once to Wadai, where Dr. Vogel was murdered, and he hoped to recover the papers of that traveller.

Fifth Meeting, 28th January, 1867.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in the Chair.

ELECTIONS.—*Viscount Adare; Richard Baxter, Esq.; Frederick N. Gisborne, Esq.; Carleton L'Estrange, Esq.; Alexander F. Low, Esq.; Charles Lanyon Owen, Esq. (Lieut. Royal Marines); Colonel C. W. Tremenhare, R.E.*

ACCESSIONS TO THE LIBRARY SINCE THE LAST MEETING. *Donations.*—*'A Voyage to the Isle of Elba.'* By A. Thiébaud de Bernand. 1814. *'Remarks on some Parts of Italy.'* By Joseph Addison. 1701-1703. *'The Argonautics of Apolonius Rhodius.'* By Francis Fawkes. 4 books. 1780. *'Travels of an Arab Merchant in Soudan, Darfur, Wadai.'* Translated by Bayle St. John. *'Diary in the Dardanelles, from Tenedos to Marmora.'* By Wm. Knight. 1849. All by S. M. Drach, Esq., F.R.G.S. *'Correspondence of Lieut.-Colonel L. Pelly, Political Resident, Persian Gulf, with Government of Bombay.'* Map-routes of caravan, &c. 1864. By the Secretary of State for India, *'Neueste Nachrichten aus den Innern Afrika's von G. Rohlf's.'* By Dr. Petermann. Lieutenant Ross, *'Visit to Kej, through Mekran, from Gwadur to Kurrachee.'* Also *'Notes on Mekran.'* By the Governor of Bombay. The Classified Index of the Athenæum Library Catalogue. 1867. By the Committee of the Athenæum Club. *'The Elements.'* Vol. 2. By Wm. S. Jordan. 1867. By the Author. *Statistics of New Zealand.* 1866. *'Relação da Exploração do Rio Purús'* by Joao Martins da Silva Coutinho. 1862. By Rev. J. C. Fletcher. *'L'Origine des Berbers-Thamon, à propos des Lettres sur la Sahara.'* By Henri Aucapitaine. By the Author. *Liber del Saber 'De Astronomia.'* Del Rey D. Alphonso de Castille. *'Die Bedeutung moderner Grand-Messungen.'* By Dr. Carl M. Bauerngeind. *'Kunde des Morgenlandes.'* Prof. Dr. Hermann Brockhaus. By the Author. *'Alcalá de Henares.'* Description por D. Antonio M. Lopez y Ramajo. 1861. *Purchased.*—*'The Story of the University Mission to Central Africa.'* Rev. Henry Rowley.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING.—Map to illustrate the Route of M. du Chaillu in Central Africa. Presented by the Author. 2 Maps of Asia Minor, Geographical and Geological. By P. de Tchihatchef. Presented by Sir R. I. Murchison, President. Map of Russia and Sweden, No. 36 of Stieler's Hand Atlas. Presented by A. Petermann. Map of Cooper's Creek and the adjoining Stony Desert, from the journeys of Sturt, Wills, McKinlay, and

Howitt, from 1845 to 1862. Presented by A. Petermann. Admiralty Charts, 12 in number. Ordnance Maps, 223 sheets, and 21 Area Books.

The following Papers were read :—

1. *On the Geography and Climate of India, in reference to the best Site for a Capital.* By the Hon. GEORGE CAMPBELL, of the Indian Civil Service.

(Extracts.)

If it be conceded that a new capital is wanted, and if there be a pretty general agreement on the most essential requisites for a European capital in India, it only remains to go forth, map in hand, and try to find a suitable place. I have for many years had occasion to turn my attention to the collection of facts regarding the present condition of India, and have continued that practice till it has become a habit of my life. I have made the round of all the British Provinces. It has been my fortune to be employed in widely different parts of India, and thus to have acquired a personal familiarity with at least four of the great Administrative divisions.

The following are the points especially to be kept in view in selecting the site for the capital :—

1. It should be as far as possible central, geographically and politically, and easily accessible from the different parts of India.
2. It should be within easy reach of the sea, but not so near as to be exposed to danger of attack from the sea; *cæteris paribus*, that coast would be preferable from which there is the most direct and rapid communication with Europe.
3. The climate should be temperate, and, with such aid as local surroundings may afford, tolerable throughout the seven or eight warm months of the year. At the same time it should not be too cold, damp, or rainy, nor unfitted for native constitutions at that season.
4. The site should be sufficiently roomy, should afford space for some European settlement, and should possess such amenities in itself and in the neighbourhood as might be expected to attract settlers, schools, &c.
5. It should be within reach of the influences of the public opinion of a great European and civilised native community, engaged in practical business.

Among the requisites are some which must be considered, to a great degree, obligatory, and without a tolerable mark in which no candidate can be passed. These are, I think, climate and nearness to the sea, and perhaps also the immediate proximity of a great

public opinion. If I am right as regards these obligatory conditions, our inquiry might be narrowed much. It might probably be assumed that no place within fifty miles of the sea will answer the purpose. We should then but have to take a strip round the Peninsula, ranging from 50 to 150 or 200 miles from the sea, and to see if we can find a good climate in that space. If, again, it be admitted that it is necessary to be in easy communication with and within the immediate influence of one of the present great centres of Indian business and civilisation, the question is much farther narrowed, and becomes simply this, Is there within a few hours' journey of Calcutta or of Bombay a place suited by climate and position for the new capital? We know that there is no such place near Calcutta. Therefore we come to the still more narrow question, Is there such a place within reach of Bombay, within a couple of hundred miles of Bombay, on one of the main lines of railway diverging from that place? In short, is there any suitable site in the high country which exists immediately above Bombay?

But I propose to take a wider survey of the whole country, and fairly to compare the advantages and disadvantages of different places in their various aspects.

I can answer for myself that though I have taken a good deal of trouble in the way of inquiry, I never fully realised the character of the countries which I had not seen till I did see them. Even as regards ordinary geography, I once imagined that a low plain extended to the south of the Neilgherries, through which the Madras Railway ran to the opposite coast, and was astonished to find myself running through a picturesque hilly country, 1500 feet above the sea, on a line abounding in steep gradients and sharp curves. I believed, too, I confess, that the Concan was a flat country between the ghats and the sea, a sort of Indian pontine marshes, and that the Nagpore territory was "otherwise called the valley of Berar." On the other hand, I never knew an intelligent Madras or Bombay man who did not imagine Rohilkund to be a delightfully hilly country. My impression, then, on the whole subject is, that though the amount of knowledge regarding every part of India is vast, it wants putting together; and my attempt is merely in a rough way to put together the most salient points of our knowledge, so far as regards my present subject.

It is probably unnecessary to say that India is on the land side shut out and walled off from the rest of the world by the system of great mountains which extend in a curve approaching to a semi-circle from Kurrachee to Chittagong, in which any altitude may be attained from the side of India, and which are for the most part

inaccessible from the other side. Of the highest and most secure portion of this mountain system, the great Himalayan range, a considerable extent is British territory, stretching in several places right up to the eternal snows and to the borders of the Thibetan plateau of high Asia. The outer range of the outer Himalaya very commonly attains a height of 7000 or 8000 feet, and a sea of mountains extends back for 100 or 150 miles to the inaccessible snows. The general characteristic of the range may be said to be that as a rule it contains no valleys, no lakes, and no table-lands. There is but, as it were, a gigantic system of ravines; the valleys are ravines, and the mountains are very steeply-inclined sharp-backed ridges.

On the hills throughout the entire range it may be said that there is not one acre of level ground. The sparse dwellings and fields of the hill-men are terraced on the mountain sides, or obtained by taking advantage of petty nooks and shoulders of hills, indistinct alluvial steps on the sides of ravines, and small strips of rice-land at the bottom. Except on the rare roads, curiously constructed with great engineering skill, wheel and even most animal carriage is out of the question; and even on foot none but a hill coolie, an inveterate sportsman, or a mountain sheep, can attempt to leave the roads.

Within this system of mountains lies the great alluvial, or diluvial, plain which also extends in one continuous curve from the mouths of the Ganges to the mouths of the Indus, with a breadth of about 150 to 200 miles, forming, in the different portions of its length Bengal proper, the North-West Provinces, and Oude, the Punjab territories, Scinde, with the adjacent desert, and, perhaps we may add, Guzerat. Here the contrast to the hills is carried to the utmost; for as in the hills there is not a piece of flat ground sufficient to plant the sole of one's foot, so in the plain there is nowhere, it may be said, an undulation of twenty feet, and no such thing as a stone of the smallest dimensions throughout its whole extent. For our purpose the plain may be considered as nowhere rising perceptibly or materially above the level of the sea.

The whole of the rest of India may be said to be composed of one solid formation of a pretty uniform character, to which the deltas of the rivers and low diluvial lands of limited extent are mere exceptions. By far the greater portion of all this tract is a rocky and more or less hilly formation, considerably elevated above the level of the sea, and it is contrasted equally with the Himalayas and the plains; for as the one is all sharp-peaked ridges without valleys, and the other all dead-level plain, here it may be said that there is nowhere either one or the other; all the hills seem to have flat tops, and all the rest is undulating high land and valley. Hills are

nowhere altogether absent, and the country is seldom purely mountainous. This formation ends to the north and south in two apexes conspicuous on the map, the city of Delhi and Cape Comorin, which, singularly enough, are as exactly in the same longitude as if they had been laid out with a plumber's line. If we include Cutch and Kuttywar, we may describe the whole as a diamond-shaped country, the points of which are Delhi, Cape Comorin, Cutch, and Rajmehal. The geological character of the whole of this region is, I believe, in its principal features much the same throughout, and very peculiar, large masses of trap being constantly thrown up over the sandstone and other formations into hills and eminences, which again are usually capped by the singular flat tops composed of red laterite. The soils (with the exception, of course, of the alluvial and diluvial deposits interspersed) seem to be pretty universally composed of two sorts; the peculiar black soil, said to be the *débris* of the trap, often of considerable depth, and lying upon a retentive kind of rubble, and the red soil the *débris* of the Laterite. Both are fertile, though as different in their characters as heavy and light soils can be.

Delhi, as is well known, is situated within a few feet of the level of the plain, on the last low spur of the red sandstone projecting towards the north, so that not only historically but geographically it is a permanent point. It is, as it were, the last point where a city is not liable to be washed off the alluvial soil by a change in the course of the great rivers. Agra is also on the edge of the solid formation. For a considerable distance south of Delhi the country does not seem to rise to any considerable height, and when it does rise it is very gradually to the south and west. Farther east, opposite Allahabad and Mirzapore, there is a more marked and sudden rise by a steep ghat line, and as we go south and west we come to a considerable elevation and a pleasant climate. Neemuch is about 1400 feet high, and farther on many stations, situated widely apart, are all placed at a pretty uniform height of about 2000 feet above the sea, viz., Sangor, Indore and Mhow, Oodeypore, Baitool, Chandwara, Seonee, Hazareebagh, and others. In the extreme west the Aravallee range culminates in Mount Aboo, upwards of 5000 feet above the sea. Along the southern face of this high land a considerable height is also attained in several places.

It appears to me that the common assumption that the Nerbudda is the boundary between North and South India is a mistake. Rivers never are ethnological and seldom geographical boundaries. The Vyndya range, north of the Nerbudda, in the sense of a marked dividing line (a sort of backbone of India as it is sometimes supposed to be) seems to be quite a myth. I mean, that it is not an

elevated range of hills forming a real and substantial boundary. The country to the north having already attained a general height of about 2000 feet, I believe that scarcely a peak of this range rises 500 feet above the general level; at any rate, it is certain that throughout the whole range there is not a spot which has ever been used or suggested as a sanitarium on the smallest scale. On the upper valley of the Nerbudda there is not even a heavy descent; the roads seem to find their way into the valley without any very steep or marked ghats. It is only lower down, when the Nerbudda has cut a deeper and narrower gorge into which it rushes down over rocks and falls, that its level is low, jungly, and unhealthy. It may be said that south of the Himalayas and north of the Nerbudda there is no available ground whatever above the general level of 2000 feet, excepting Mount Aboo.

What is called the valley of the Nerbudda seems to be in fact but a narrow and partial depression in the general level of the high land, into which the Nerbudda runs at Jubbulpore, and out of which a branch of the Soane runs the other way, a little to the east of Jubbulpore. Easily the roads from north to south make a slight descent to Jubbulpore and Nursingpore, and easily they rise again to their former level in the country south of those places. That country as a plateau reaches its greatest height of 2200 or 2300 feet quite on its southern edge, immediately before we come to the steep ghats on its southern face which lead down to Nagpore and Berar; and on this southern face of the plateau the hills do rise considerably above the general level, constituting what I shall in general terms call the Sautpoora range. That range seems to me to be the only real backbone running east and west. In the sense in which I use the term, it extends from near Broach by Asseerghur, Baitool, Pachmaree, Seonee, Ummerkantak, Sohagpore, Hazareebaugh, and Parisnath, to Rajmehal, and divides the watersheds of the Nerbudda and Ganges from those of the Taptee, Godavery, Mahanuddee, and Damooda. The Pachmaree hills in the Central Provinces are about 4500 feet. Near Ummerkuntak there is similarly high land, and Parisnath is 4478 feet high. The southern face of this range seems to be in every way the true natural and ethnological boundary of North India. Till we come to these ghats the population (with the exception of the scattered Gonds and Khonds of the hills) are Hindee speaking, and in all their characteristics Hindoostanees.

Immediately under the southern face of the Sautpoora there is generally a strip of jungly, unhealthy, and almost uninhabited country, which still more tends to make the natural boundary distinct. As soon as we get south of this line we are among the Mahratta-speaking population of Kandeish, Berar, and Nagpore, the

Ooryahs of the Mahanuddee, and the Telingas of the Lower Godavery, in short, in Southern India. I designate as the northern plateau the country rising to the south and west from Delhi, Agra, Allahabad, and Sasseram, into Central India, and bounded on the west by Aboo and the Aravallees, on the south by the great length of the Sautpoora range from Tooran Mull to Parisnath.

This northern plateau is separated from what I shall call the southern plateau by a depression much deeper and more considerable than that of the Nerbudda, and forming a much more distinct geographical division. It may be said to extend right across India from the gorge of the Lower Taptee, by Kandeish, Berar, the valleys of the Nagpore Province, and the course of the Wardah and Godavery to the Bay of Bengal. This country does not descend quite to the level of the sea, nor is it so flat an alluvial plain as the great plains of the Ganges. But it is all situated at a level so low as to make its character entirely tropical. The whole of the country between the Godavery and the Mahanuddee, and again from the Mahanuddee to the borders of Bengal, is (with the exception of the strip along the coast) unhealthy, jungly, and sparsely inhabited in the extreme. This is, in fact, the great tract so long marked as "unexplored," and to the present day almost a blank in our maps. This unexplored country seems to be very hilly and broken, and it lies, at the same time, for the most part comparatively low, and within the worst fever-level. But on the south-eastern border, approaching the sea, as if to make up for previous deficiencies in elevation, the eastern ghats rise far beyond their height in any other portion of their course. As, however, the healthiness and practicability of these places has not been ascertained, and I do not think it probable that under any circumstances any one will propose to place the capital of India there, it will probably not be necessary that I should recur to them.

We may say that the depression dividing the northern plateau from the high country to the south attains its greatest breadth of about 60 miles in Berar, and is there a very well-defined valley, distinctly bounded by the Sautpooras on one side, and by the southern ghat range on the other side. The proper western ghats (as the name is usually applied) seem to end at the Taptee, for beyond that river, though a broken hilly country is continued to Aboo and the Aravallees, it is not so clearly marked as a defined range running north and south. From thence the north extremity of the proper western ghats just south of the Taptee, as if the ghat had taken a turn at right angles, the range which I have already in general terms described runs east and west. It is comparatively low, and at first not very prominently marked, sloping gradually into Kandeish, but

further east it is very well marked, and contains, as I have said, some pleasant climates about Ajunta, Booldana, &c. It is, however, more important for my purpose, as marking the northern limit of the southern high land. The line of this range, and its continuation of hilly country along the right bank of the Godavery to the eastern ghats, may be said to mark off from the rest of India the Deccan, or south country. This south country, again, is principally occupied by the high land to which the term Deccan is in its more general sense applied.

The Deccan may be described as a triangle bounded by the northern line already mentioned; the western, and the eastern ghats. But the country about the Lower Kistna and Godavery seems hardly to partake of this character, and there does not appear to be any high ground which requires mention in that portion of the eastern ghats; therefore we may limit the eastern boundary of the southern plateau to about the longitude of Hyderabad. It extends, then, for our purpose from Berar to the Neilgherries, and from the parallel of Hyderabad to the western ghats. It may be said to have a general level of about 2000 feet, the plateau generally ranging from 1500 to about 2500 feet, and most of the stations in the Deccan being either a little above or a little under 2000. Belgaum, Dharwar, and Mysore are about 2500, while Bangalore alone attains 3000. The plateau generally slopes gradually from west to east. All the rivers rise in the western ghats, and find their way through the eastern ghats to the Bay of Bengal.

The western ghats all along the line rise in ridges to a considerable height above the level of the plateau; but there are everywhere passes through them, little, if at all, above the ordinary plateau levels. In fact, the ghats are not, as generally depicted, a ridge running north and south. The rise of level, the break, as it were, and upheaval in the crust of the earth, runs north and south, but the hills are rather a succession of transverse ridges, placed, as it were, edgewise to this line of general elevation. The sudden break in these ridges, and subsequent denudation by watercourses and landslips, gives to the broken ends a peaked and jagged appearance when we look from below. But on the other side, where the ridges run back into the Deccan, the usual flat-topped character of the hills is observed, and along, as it were, the flat backs of the ridges, ground is found fitted both for cultivation and for sanitarium, not broad, but running back in narrow irregular slips and promontories. On such places, at elevations of from 3500 to 4500 feet, say generally about 4000 feet, are and may be placed sanitarium, in a cool climate, at many points all along the ghats. The transverse ridges themselves gradually tail off into the Deccan, but some of the most

prominent may be traced for almost hundreds of miles, *e. g.* one runs from immediately over Bombay (from about Jooneir) to Beder, not far from Hyderabad. On one of the flattest tops of one of these transverse ridges, immediately overlooking the drop into the lower country, and therefore, at one of the highest and coolest points, is Mahableshwar. All over the Deccan occasional flat-topped hills stand up here and there, and are sometimes so large and so high as to afford room for sanitarium. There is a good one near Bellary 3500 feet high, two near Bangalore marked 4600 feet, one in the north of the Mysore country marked as upwards of 6000 feet high. Between the ghat ridges the narrow passes through which the roads are carried soon expand into the large valleys and broad irregular high-level plains of which the Deccan is mainly composed.

At the southern extremity of the southern plateau the western and eastern ghats seem to run together, and to be heaved up into the great block called the Neilgherries, which, again, has a flattish top about 7000 feet high. South of the Neilgherries there is a great depression, which does not altogether sink to the level or character of a plain, the railway through this depression running through a country for the most part hilly, and in places as high as nearly 1500 feet. Beyond this depression, again, rises another block or range almost as high as the Neilgherries, and similar in character, which, at a greater or less elevation, extends to Cape Comorin, and the different parts and branches of which are known as the Pulneys and Anamullees, Travancore and Tinnevely hills: they are all parts of one connected range.

Thus, then, I have, I think, exhausted in general terms the map of India, with especial reference to the altitudes by which the climate is so much determined. Setting aside those parts which I have dismissed as immaterial to our present purpose, I may say, then, that we have the following regions:—

1. The Himalayas.
2. The Great Plain.
3. The Sea Coast.
4. The Northern Plateau.
5. The Southern Plateau, or Deccan.

The south-west monsoon may be said to blow partially from that quarter at an earlier date (especially in the south), but it only acquires strength, and begins to bring in the regular rains about the beginning of June. It is chiefly felt as a regular monsoon (that is, a strong and constant wind from one direction) on the west coast, and in the countries which derive their supply from that quarter. There it comes in from the west with great violence in June and July; and though the wind becomes lighter in August, the rains

may be said to last to the beginning of October. It appears, so far as I can gather, that they are not quite so heavy in the extreme south, but going northward, along the Malabar and Canarese coasts, they are excessively heavy, and so continue till towards Bombay they begin to lessen in intensity. North of Bombay the quantity of rain lessens; in Guzerat it is much less, and further north it disappears altogether; so that in Scinde and the desert there is no regular rainy season, and scarcely any rain. The great plain, therefore, gets no rain supply from the west, unless, indeed, any of the western clouds find their way to Agra, or other places on the banks of the Jumna, of which we have no information. The mass of the clouds brought up by this west monsoon are poured out on the western ghats, the rainfall there rising as high as 300 inches or more, and rendering all the exposed places on the ghats and neighbouring hills almost uninhabitable in the rainy season. But though these very watery clouds reach to the top of and over the crest of the highest of the ghats, it is singular that they go little beyond the outer line. It appears one of the most extraordinary phenomena to be seen, that on these ridges you may stand at an elevated site and see one point (near the edge) where there is a fall of 300 inches, another, 8 or 10 miles further back, where the fall is not above a fourth or fifth of that quantity, and another half-a-dozen miles further still, where it is almost reduced to a minimum, perhaps is not more than 18 or 20 inches in the year; and all the while there is no visible obstacle to arrest the progress of the rain between these places. In fact, the monsoon, so far as the current of air is concerned, continues its course uninterrupted. It seems that the rain-clouds just curl over the top of the western ghats, and in the course of about 15 miles lose the whole of their excessive moisture. The country beyond gets all the benefit of the coolness and airiness caused by the rain and wind, without the heavy rain itself, and consequently the climate of this country beyond the ghats appears to be, during this rainy season, one of the most delightful in the world. This gives the country about Poonah and along the line of the rail towards Sholapore an arid and treeless appearance.

In the south, towards Dharwar and the Mysore country, the supply of rain is better, and there is not the same aridity. On the Neilgherries the fall of rain is not so excessive as to drive away the European residents, but throughout the rainy season there is much driving heavy rain; and in this respect Ootacamund seems to have no advantage over Simla and the Himalayan stations. In all India there are but two tracts thus deprived of the rains brought up by the south-west monsoon, Scinde and the desert in one quarter, and the Madras coast in another. It is this want of summer rain

which gives their great importance to the irrigation works of the Madras deltas, since the rivers, filled by the immense rainfalls of the western ghats and the moderate periodical rains of the intervening country, are just at their highest when water is most wanted in the deltas, and it is then most easily distributed from the over-filled and overflowing channels.

In the northern portions of the country watered by the western monsoon it appears that, although the coast supply of rain is much smaller than farther south (decreasing from about 180 inches at Mangalore; and 120 in the further Concan, to about 35 in Guzerat), the country in the interior is better watered by the monsoon than farther south in the Deccan. All Central India seems to receive its rain-supply from the west. Berar and Nagpore are well watered, and the neighbouring stations on the northern plateau are moist; Baitool and Seonee are so, and Jubbulpore is, in the rains, decidedly moist and tropical. Mhow is dry, but there is more rain at Neemuch, and Saugor is cloudy and well watered in the rains. It appears that throughout Central India there is a peculiar cloudiness in the rains, so that at Saugor and Jubbulpore the sun is sometimes seldom seen for a month together.

It may be generally remarked of all the countries affected by the direct westerly monsoon that the rain comes with a much more steady and regular wind than in the plain of the Ganges. It may be expressed that the one is a proper monsoon, and the other only a rainy season. This steady wind makes the rainy season cooler and less muggy. The remark, of course, applies in a greater degree to stations more nearly and directly exposed to the westerly monsoon than to those at a distance; but even at Nagpore, at a scarcely greater elevation than Meerut or Delhi, and nearly 500 miles from the sea, the rainy season is very much cooler and more pleasant than at those places. It may, then, generally be said that all the places partaking in the monsoon of the west coast (except those where the rain is unendurably heavy, or where the elevation is too great to make the wind a desideratum) have, altitude apart, a pleasanter climate in the rains than those of the Bengal Presidency, and that as almost all the stations in the interior are placed higher than those of the great plain, without being too high, they are, as a rule, very much pleasanter at that season.

Another branch of the south-western monsoon at the same season affects the greater part of the Bay of Bengal and the eastern side of India. In the southern part of its course this branch is separated from the western branch by the Madras country, and part of the adjacent sea. Rounding the southern extremity of Ceylon, the monsoon takes a south-westerly direction, and thus keeps clear of that

part of the eastern coast which runs nearly due north and south. But as it gets farther up the Bay of Bengal it blows more directly from the south. At Vizagapatam the fall seems to be light; it increases in Cuttack, and is pretty heavy in Calcutta. The total annual rainfall there is about 65 inches per annum. In Eastern Bengal it is much heavier, and on the hills of the extreme east it is enormous, sometimes, it is said, as high as 600 inches in a year.

At Calcutta and in Lower Bengal at this season (and for some time before in the hot weather) the breeze is hardly strong and regular enough to fulfil the idea of a monsoon, but still there is a pretty constant southerly current to which that name may perhaps be given. Proceeding north, this current is again deflected to the west, and so in a weakened and less constant form it proceeds up the plain of the Ganges. It can no longer be called a monsoon, and is very varying and inconstant; but still there is, during part of June and the following months, a general tendency to south-easterly and easterly winds or currents, which bring up the monsoon rains, and to which the country is indebted for fertilising moisture. As a general rule, then, the whole upper plain of the Ganges receives its rain supply from the east; and this supply, though from a contrary direction, is moved by the same impulse, and is, as it were, part of the south-west monsoon. Proceeding farther up the country, the supply becomes less and less, but seldom fails altogether till we pass into the watershed of the Indus system of rivers. It is always heavier near the Himalayas than farther from them. Passing Delhi, the flat country to the left is very scantily watered, but nearer the hills the supply continues. Crossing the Sutlej, the Jullunder Doab is well watered, but at Lahore the supply is scanty and precarious, and farther on the watered country becomes narrower till, beyond the Jhelum, these periodical rains seem to be confined to the hills. Everywhere in the plains the breeze being so light and uncertain, and the rain-supply broken and interrupted, it is frequently or generally muggy and hot throughout the rainy season. In the lower parts of the Upper Provinces, and near the hills, the annual rainfall may be taken to be 40 to 45 inches; further up and further from the hills it diminishes to about 25 inches. In the greater part of the Lower Punjab there is no regular rainy season that can be depended on, and the absence of rain in the tract between the Punjab, the ocean, and the Aravallee range causes the great Indian Desert.

It is not till very high ranges of 13,000 or 14,000 feet intervene that the periodical rains cease in the hills; but far in the interior, beyond those high ranges, they are little felt. In the remote hill-

regions, twelve or fourteen marches beyond Simla, we are nearly beyond their influence. It is the same in Cashmeer, and the rains do not reach into Thibet.

The Bengal branch of the south-west monsoon seems to be, as it were, slewed round to make the north-east monsoon. The country in the east of the peninsula, which receives a share of both monsoons, is rendered moister than those which receive but a scanty share of one. The easterly October rains, though heavy only to the east, seem to extend in a slight shape almost throughout the breadth of the peninsula, being more distinctly perceptible in the centre, and less so in the west.

As respects the rest of the year, northerly currents of air prevail, I believe, for some months on the Indian Ocean. In Calcutta the cold weather air generally comes from the north. In the Upper Provinces there is no very prevailing wind in the cold season, and the nights are usually quite still. In March, April, and May, again, westerly wind prevails in the Upper Provinces, and as the desert and dry country over which it blows becomes heated, these winds become the hot winds of May and June. All round the coast, during the whole season in which the strong monsoon is not blowing, the diurnal sea and land breezes are constant.

I think that I have now mentioned all the main elements affecting the climate generally. Now as to the result on the climate of particular places.

Taking Calcutta, Madras, Bombay, and any good station in the plains of the Upper Provinces, it is impossible decidedly to say which is best; all are so balanced that those who prefer one or the other may, with some reason, maintain its superiority. It may be observed that, for three or four months Calcutta is quite cool enough for ordinary sedentary residents, so cool that the feeling of disagreeable heat is altogether absent. At the same time, the air is not very bracing. Up the country the cold weather is decidedly superior; it lasts longer, is colder and more dry and bracing, without being (till, perhaps we get up as far as Lahore) at all raw or disagreeable. On the other hand, the hot weather in Calcutta, though no doubt very hot, is tempered by the southerly breeze which often makes the evenings almost cool while we are directly within its influence; whereas the heat up-country of the two months from the latter part of April to the setting in of the rains is tremendous.

In the rains, again, the southerly breeze and abundance of rain make the first part of that season in Calcutta preferable, I think, to the Upper Provinces, where there are often very hot breaks in the

weather, and a tendency to muggyness. Later in the season, when the wind fails, Calcutta is much more moist than the drier country; but, then, again, the rains last longer, and there is not so much of the fever and ague which often attend the hot drying up of the rains in many of the less moist stations of the Upper Provinces.

On the whole, I think Calcutta is a dangerous place for new arrivals, but, perhaps, not more trying to acclimated sedentary residents, living there all the year round for a series of years, than would be a similar life at an up-country station. Although healthy people leading an active life up-country may look much better than those who sit in offices in Calcutta, still, for sedentary legislators and administrators fixed for business in the hot and rainy months, there would be no very great advantage of climate at any station in the plains of the Upper Provinces.

Madras being only less warm than at other seasons for a short time in the cold season, and little cooled by the south-west monsoon, has an average temperature higher than any of the places with which I am comparing it. Some people seem to live robustly there to a good age. There are also now excellent facilities for getting away for a change to Bangalore, the Shevaroy, and the Neilgherries.

The country under the western ghats is not so unhealthy as such sub-montane tracts in tropical climates sometimes are. But the low, confined valleys which the sea-breeze does not well reach are decidedly unhealthy. The sea-breeze is everything in those parts; and at all the places on the coast, to be either cool or healthy, you must be actually on the sea and exposed to the direct action of the breeze. Bombay itself is by no means an unhealthy climate. It seems to be pretty free from malarious influences. On the whole, Bombay, taken by itself, seems to be a healthier place than Calcutta, and, taking into consideration the facilities for change, it is much healthier. In the rains, within 120 miles by rail, that is, 7 or 8 hours' journey, is the delightful climate of the Deccan.

It would be useless to carry this comparison farther; the present capitals of the different provinces are sufficiently good instances of the climate of the plains and of the coast; and no other places similarly situated are likely to be chosen to supersede them. To find a better climate we must look to a greater elevation.

At an altitude of 7000 feet, which is about that of our hill sanatoria, we secure a cool European temperature throughout the warm months of the year; and in the northern hills, where there is also a cold winter, the climate might be described as European throughout the year were it not for the marked periodical rains. At Simla and Mus-

sooree the hot weather is, in the day, like the warmest and most sunshiny English summer weather. At Darjeeling, the rains, and more especially the mists, commence earlier and leave off later, and the fall is heavier; there is, therefore, a much smaller proportion of agreeable weather. On the whole the hill climate is probably, in itself, not much less healthy than England, but the confined character of the ground, and the want of room to move about, certainly make the hill stations much inferior to England for the development of a growing human frame.

The summer climate of the Neilgherries is about equal to that of the Himalayan stations; it seems to be mere matter of varying opinion which is preferred. Probably, the greater flatness and roominess of the ground about the Neilgherry stations, and the absence of extremes of climate, render them a better residence for permanent inhabitants of stationary habits. Ootacamund seems to be not altogether free from a little fever, and at somewhat lower elevations in those southern hills fever is unluckily very prevalent. It appears that the fever range runs very high in those parts. The Wynaad and other places, 4000 or 5000 feet high, suffer much from this scourge. It is, therefore, not necessary to consider, as fitted by climate for our purposes, any places at an elevation between the high level of the Neilgherries and the ordinary height of the southern plateau.

The sanatoria on the edge of the western ghats in the Bombay Presidency are not, at the highest point above, 4500 feet; but then they are within the influence of the sea-breeze, which, in the hot weather, is so constant that the heat is never oppressive, even at a less elevation than that which I have mentioned. At this season these places are, probably, at least as healthy as any of the higher hill stations—perhaps more so. Indeed they seem to be, throughout the year, free from any marked unhealthiness. But during the rainy season, the mere force and amount of rain causes them to be deserted; the more so as the much better climate of the Deccan at that season leaves no temptation to remain on the ghats.

A few miles inland, however, on the backs of some of the higher ridges, places may be found where the climate is good all the year round, the rains not being heavier than at Simla or Ootacamund. Of course, as we remove from the direct effect of the monsoon, we also somewhat lose the force of the hot weather sea-breeze; but say at 4000 feet high, within 15 or 20 miles of the edge of the ghats, the breeze is not wanting in the hottest weather, the climate is never disagreeably warm, and, for a permanent residence in an open healthy situation, and among cultivated fields, there are probably

no better sites in India than these; the Neilgherries, perhaps, excepted.

There remain among high elevations only those of the Sautpoora range. Unfortunately it happens that no situation, combining considerable height (I mean something above, say, 3000 feet), space and healthiness is to be found. A good deal of unhealthiness hangs about the whole line of this range. In the north of Kandeish, about the Nerbudda under Mhow, and in the jungles near Asseerghur there is very bad malaria. This unhealthiness of the valleys also, in some degree, extends to many of the wooded hills of the range. The portions of the range which ascend to a high level are very rare and limited, and in point of mere space insufficient. Nearest to the sea, and so far very favourably situated, is the newly discovered Tooran Mull in the north of Kandeish, said by its discoverers to be delightful; but, if so good, it seems strange that it should yet be but imperfectly discovered.

A good way farther east we come to the Chikuldah hills, which form a pleasant local sanitarium for Berar, but they are only about 3000 feet high, are not very healthy in the rains, and are very limited in extent. Pachmarree and Mohtoor are a little higher, but the same remarks apply to them.

The open parts of the adjoining plateau are pretty healthy. Parasnath, though it may be, as I have already suggested, a good place of local and temporary resort from Calcutta, is not fitted for anything larger than that. I repeat, then, that in the Sautpoora range, there is no extensive site with a high elevation and a climate always cool and healthy; so that resource must be abandoned.

I now come to the middle-placed plateau climates at elevations of from about 1500 to 3000 feet.

The southern plateau may be generally described as remarkably healthy. Bangalore is one of the best stations in India. In the north of this plateau, in the Bombay Presidency, the districts near the ghats are the healthiest of all, being free from jungle and from excessive rain and moisture, and, in addition to a considerable elevation of about 2000 feet, having the advantage of a sea-breeze in the hot weather, and of the cool monsoon-breeze already described in the rains. With the exception that the cold weather is inferior to that of northern India, the Deccan climate is clearly vastly superior to anything known in the plains; the hot weather is much less hot and more easily avoided, and the rains are as superior as the best climate can be to the worst. That the climate is, in truth, very healthy to the European constitution is clearly shown by military statistics. The Deccan stations of the Bombay Presidency are, it

would appear, among the healthiest quarters of the British Army. An average of ten years' return in the Appendix to the Report of the Royal Sanitary Commission shows the annual mortality of the European troops at these Deccan stations to be only $1\frac{3}{4}$ per cent. or between 17 and 18 per thousand.

The northern plateau, with the exception of the jungly parts on the southern edge, is generally healthy. Yet here and there the taint of fever slightly extends into the open country. Mhow has a very pleasant and healthy climate; and Malwa is a very fine and very central country. If Malwa had been British territory, it might have been very well worthy of consideration for our present purpose; but as it is not, and there is no prospect of its becoming so, we must put it out of the question. It may, however, be mentioned that Mhow does not seem to have the advantage of climate over the Deccan stations, although the latter are a degree or two south at the same elevation of about 2000 feet. Saugor, in British territory and about the same height, had also a mild and good climate, but besides being very far from the sea it is off the line of the Rail and has no hill sanitarium near it. Jubbulpore again, though one of the pleasantest-looking, and to those with whom it agrees most pleasant stations in India, is unfortunately decidedly feverish. It is perhaps, with reference both to geographical position and to the great lines of communication, the most central spot in all India; and in point of situation, fertility and beauty of vegetation and surroundings, it cannot be surpassed.

On the whole, I think it must be considered that the climate of the higher parts of the northern plateau are not so good as those of the Deccan.

Bombay is, beyond, I think, all doubt or question, destined to be in every way the port of India. Instead of the present great route from Calcutta to the Upper Provinces, the grand route will be from Bombay, through Central India, to the Upper and Northern and even Eastern Provinces, and the second important route will be from Bombay to the South. Bombay, and not Calcutta, must then be the main starting point and basis of Military, Commercial, Industrial, and Social enterprise in the interior of India. The European community must be greatly extended and amplified, new demands will create new supplies; if the present town will not suffice, new towns must rise, around the only good harbour on the west coast of India; and altogether Bombay must advance enormously, and must, it seems to me, in a short period greatly surpass Calcutta, which will be in future only the prosperous capital of rich Bengal.

I conclude, then, that looking to the different elements, European

and Native, and to the early future as well as to the present, Bombay is a place of greater importance and a more powerful attraction in fixing the seat of Government than Calcutta.

I have already expressed the opinion that the permanent capital should be within reach of the sea, and that the Himalayas are thus rendered unfit for our purpose. I also think that, if that objection were over-ruled, still the offices and permanent capital should not be placed out of reach of the ordinary population and traffic, out of the course of affairs, and removed from the practical stir of life to a remote ridge in the interior of the Himalaya.

The Neilgherries are within a moderate distance from the sea, and have very many advantages. But, in my opinion, they are too far removed in a remote corner of India, and too distant from the most important populations and the greatest Political, Military, and Commercial centres. They are also subject to the exception, which I have taken, against places too much isolated by height and climate from the ordinary business and people of the country.

Bangalore is not sufficiently central. We next come to the Deccan high land of the Bombay Presidency. And here I must premise that the most well-known station in the Deccan, viz. Poonah, is by no means the most favourable specimen of that country. Poonah is neither an ancient historical site nor a selection of the British Government. As a place of temporary resort during the rains, probably, convenience of situation and all things considered, no place could be much better. The excessive dryness, barrenness, and aridity of the soil and climate which detract from the place at other times, are rather an advantage during the rains.

But both north and south of Poonah the Deccan presents a much more favourable aspect—is more fertile, greener, and cooler. All the stations to the south, Belgaum, Dharwar, &c., are in these respects superior and have altogether (taking the whole year round) a pleasanter climate. They are also quite as healthy, the average mortality of the European troops nowhere exceeding eighteen per thousand, and they are generally preferred as in every way better stations. Their position, however, to the south and out of the way of the main lines of communication; puts them at a great disadvantage for our present purpose. We must then look to the north of Poonah—and getting to the northern extremity of the Deccan, we come again to the other line of railway, the great line bisecting the country and connecting the great centres of British power and population in India.

If there is anything in the views which I have put forth, the best spot, geographically speaking, is the high land above Bombay, and

if it so happens that the spot thus geographically the best is also a healthy pleasant place, with a temperate climate and a good political situation, the necessary conditions will be fulfilled. I think that they are fulfilled, and proceed to give particulars.

The tract to which I allude is comparatively unknown, having been hitherto cut off from the route of passengers by want of roads. It has now been penetrated by the rail. The Thull ghat is now opened to the public, putting it in direct railway communication with Bombay, distant about 100 miles. No doubt then it will soon be better known and more resorted to; meantime I give the result of my own observations and inquiries, First as to the geographical and political position. The tract in question is the high land over which the Great Indian Peninsula Railway Company's North-East line runs, from about the 85th to about the 150th mile. As regards means of communication, hardly any place can be so central. The main line at Allahabad reaches a great centre of communication, The right or easterly line to Nagpore may eventually, by that more direct route, reach lower Bengal. A left or north line has been already surveyed to Indore, and will, without doubt, eventually reach Agra or Delhi by that route.

When I have shown my plateau to be geographically central and unrivalled in means of communication, the elements of a political centre are almost given. But I may also say that taken from a political and ethnological point of view, the result is the same. We are at the extreme north-western point of the territory of the great Mahratta-speaking race, the greater part of which (in the Bombay Presidency, Berar and Nagpore) is subject to British rule. Closely adjoining is the great Hindostanee race which occupies the north country up to the Sautpooras, and in fact so much overflows to the south that, at the point where we now are, the greater part of the labourers, carters, &c., are Hindostanees, and the Hindostanee language is as current as the Maratta. A little to the north-west is Guzerat. Within twenty or twenty-four hours' journey by rail are all the great seats of Hindostanee population and political action, on the Jumna and Ganges. Another day will bring the Governor-General to the Punjab, to Lower Bengal, or to the farthest parts of Madras. The position, then, relatively to the rest of India being so good, let us examine more minutely the locality itself. I have said that the high land over which the north-eastern line of the Grand Indian Peninsula Railway runs, at an elevation of about 2000 feet, extends from the 85th to about the 150th mile, say for sixty miles; the greatest part of this tract being nearly a plain, varied by a surrounding of hills. This tract is highly cultivated and watered by

several streams, one of which is the infant Godavery, and the others its tributaries. The soil is for the most part a fertile blackish diluvial loam, but not the ordinary black cotton-soil—no cotton grows there. In entire contrast, however, to the Deccan country about Poonah, there is (in addition to the ordinary rain crops) a great abundance of the best cold-weather crops, such as we see in the North-Western Provinces; a very large breadth of wheat, and also sugarcane, tobacco, oilseeds, gram, &c., &c. Trees thrive extremely well and look well-grown, green and healthy. The breadth of the open tract being so considerable; it is in no degree rendered hot or close by the hills, which on its outer circle nearly surround it, and which, looking from so considerable an elevation, do not seem very high. But these hills supply on all sides a great abundance of small perennial-running streams, easily used for purposes of irrigation, and which give this country a cheery, well-watered look. At the same time it is entirely free from anything like stagnation, jungle or miasma; the culturable part is exclusively occupied by cultivation, and the rainfall being small (as I have explained it to be in all the Deccan country behind the ghats) the hills are free from jungle, except on the western face of the ghats, looking the other way.

As a fair specimen of this plain of the Upper Godavery, let us take Nassick, the head-quarters of the Civil Establishments and within 5 miles of the railway. This place is by rail, if anything, nearer to Bombay than Poonah, being 116 miles to 119, the distance of Poonah. The ghat ascent is also somewhat easier. Nassick is about the same height as Poonah—rather higher than lower. The town is a compact, high built, tile-roofed place on the banks of the Godavery, of 20,000 or 30,000 inhabitants. The surrounding country is very fertile and well watered, abounding in groves, gardens, wells, and small canals. The mango-trees (their appearance is a great test in India) are as well-grown and thriving as in any place which I know, and there is a feature which I had never seen elsewhere in India, viz., many great native vineyards. Several single vineyards cover many acres each, the vines being trained high, over trees planted and pollarded for the purpose, after the Italian fashion. The vine is a great test of climate, and I fancy of healthiness. The climate is what I have before in general terms described the Deccan climate to be. Being the most northerly point of the Deccan, there is the best cold weather, without so much of a bitter, dusty wind as farther south. The rainy season is somewhat cooler than at Poonah, and in every other respect quite as pleasant. One more advantage of this same part of the country I

must add, viz, the facility for getting down in a few hours to the sea-air and sea-bathing of the cool season on the coast, on the line of the Bombay and Baroda Railway. No part of the country is more healthy than Nassick and the surrounding district.

I would propose then to select for the capital some suitable spot of this kind in the plain of the Upper Godavery, coupled with a roomy sanitarium available within a couple of hours. Between the railway station and Nassick there is a high, dry and very open site, at present somewhat bare for want of water. If water were brought upon this spot, from a few miles up the streams on either side, it might be a very admirable location, or many others might be selected and compared. The ghats, backed by the sea on one side, and these hills on another, would go far to make the capital impregnable on those sides. On the north the deep jungly valleys of the Taptee and Nerbudda, and the intervening hills, would be a sufficient defence. On the north-east it would only remain to take advantage of the north wall of the Deccan—the Chandore range, through which the railway passes to Kandeish. If it should be necessary, the few passes might no doubt easily be rendered defensible. On the east the valley of the Nerbudda would be easily held. In this elevated plain we should have, as it were, the capital in a great park of 50 or 60 miles in diameter, enclosed in a complete ring-fence. That capital would be a pleasant, healthy place in a good climate, and the European houses would be surrounded by gardens and vineries, and all things pleasant to the eye, which are so essential to a permanent abode. There would be an abundance of pleasant country, abounding in European residents and residences in the neighbourhood, and the most abundant opportunities for change of air, to cool hill-climates for those who wish to avoid the heats of the hot weather, and to sea-shore and sea-bathings for those who wish to avoid the chills of the cold weather, or the early heats of March. For seven, eight, or nine months the work of Government would go on uninterruptedly. For two or three or four or five months in the cold season, as the case might be, the Governor-General and the Members of the Government would be free to visit all India.

The PRESIDENT explained that Mr. Campbell was a gentleman of great distinction in the Indian Government, long resident in India, who in his vacations had explored a great part of the country, with the view of ascertaining the best site for a capital. The paper was of value as a review of Indian geography, and should lead to the construction of a better map of India than the one which the Society at present possessed. He hoped before another paper on this subject was read that they would be able to exhibit a satisfactory map of Hindostan, from the Himalayas down to Cape Comorin. With regard to the subject

discussed in the paper, he saw present several gentlemen of high distinction, who had passed many years in India; and he should be glad to hear observations from them concerning the climatology and geography of the country in connection with a proper site for a capital. With regard to Nassick, the place selected by Mr. Campbell as the best site, it appeared that this town had been the seat of a college of the Brahminical priesthood. He had no doubt that these learned men, like the monks of old in our own country, knew how to select the most salubrious spots for their residence.

Mr. W. J. HAMILTON (Chairman of the Great Indian Peninsula Railway) said it was only that afternoon he heard incidentally from the President that this was to be the subject of discussion; therefore he was not prepared to say more than that as the Great Indian Peninsula Railway passed through the district, it must be an object of great interest to them that such a position should be chosen as the future capital of India. He had often heard it stated that in the future the capital of India must be changed. Calcutta was too far off, too much out of the line of immediate communication with Great Britain, to be the appropriate capital of India. Bombay had been suggested as the future capital, as soon as the different lines of railway from Bombay, the nearest port to England, shall have been constructed across the Peninsula to the north-east and the south-east. But there were great difficulties connected with that site. The island of Bombay was very small: it was already overpeopled, and it was extremely difficult to find proper accommodation for the increased population brought to Bombay by the increase of commerce, and more particularly in consequence of the impulse that had been given by the construction of these railways. With regard to Nassick, there seemed to him, from comparing the observations which the author of the paper had made with what he had himself heard upon the subject, a certain amount of contradiction. In the first place, Mr. Campbell alluded to this district as being a healthy position. It might be so; but the greatest complaint and the greatest difficulty they had had to contend with in the construction of the railway was the want of water. The Ghauts into the valley of the Taptee had been a great difficulty; and even for the engines. In the next place, Mr. Campbell said Nassick was surrounded with meadows, rivers, rivulets, and canals; and yet he assumed that it must be a healthy position. Considering the climate of India, there seemed to him a certain amount of contradiction in that statement. However, that was a question which could be more accurately entertained and examined hereafter.

Sir ROBERT MONTGOMERY stated that Mr. Campbell, who was a personal friend of his, was one of their most able writers in India; yet, at the same time, he (Sir Robert) could not agree with the conclusions that he had come to as to the necessity of changing the capital from Calcutta. Was it necessary that a capital should be central? Looking to the different capitals of Europe—London, Paris, and St. Petersburg, were not central; nor was Washington, the capital of the United States of America. At Calcutta the Governor-General had other interests committed to him besides the government of Hindostan. He had charge of the affairs of Pegu and Penang, and although he was not directly charged with affairs in China, he was the chief medium of communication between England and that empire, and, in cases of difficulty, reference was made to him for advice and assistance. Therefore, with reference to China on the one hand, and Hindostan on the other, Calcutta did occupy a central position. Again, Calcutta was the centre of everything European in India. It was from thence our Indian empire began, and expanded. Our law courts, public offices, and great mercantile establishments were there. The great indigo-planters and tea-planters of the valley of the Ganges had their head-quarters in Calcutta. There were more Europeans in Calcutta than in the whole of the rest of Hindostan; Bombay included.

It was of great importance that public opinion should be brought to bear upon the government of India; and it was only in Calcutta that this could really be done, where there was a large European population and an ably-conducted press. Would there, then, be no loss of prestige in leaving Calcutta? A former Emperor of Delhi tried to remove his capital, and did not succeed. As regarded railways and telegraphs, he should himself consider that the construction of these would do away with the necessity of removing from Calcutta. A telegraph message from London would reach Calcutta and Bombay almost simultaneously, and despatches would reach Calcutta in perhaps twenty-four hours from Bombay. Again, he held that the Governor-General should not remain at the capital, except during the Legislative Session of four months or so, and that during the rest of the year he should be moving about India, going to Bombay, Madras, Birmah, and other parts of the empire; not with the state and ceremony and retinue of former times, but travelling by the railroad accompanied by a moderate staff of officers, and holding durbars, wherever it was necessary to produce an imposing effect upon the natives.

Sir CHARLES TREVELYAN said that the present question was in its essence political. The barest statement of the political question would indicate within narrow limits where the future capital ought to be. The political system of India was a system of local governments, and the part of the supreme government was to superintend the local administrations, to direct the resources of the empire to one common object, and to administer certain departments, such as the Post-office and Foreign Affairs, which were common to the whole. The capital ought not to be at the seat of any one of the local governments because it would interfere with the authority and diminish the responsibility of the local government. Sir Robert Montgomery had truly stated that the most wealthy and influential of our provinces was Bengal. It was full of resources, developing more rapidly than any other part of India; and the European element there was the strongest and growing the fastest. Yet, to say, this rich and powerful province was governed by a Council, unassisted by any Council, with secretaries with very inferior salaries; and the embarrassments which had attended the administration of the government of Bengal was in a great measure to be attributed to this weak and defective character of its government. If the Governor-General did not happen to reside at Calcutta, the necessity of giving to Bengal a more efficient government on the footing of Madras and Bombay would be at once apparent. Another objection to the supreme government being placed at the seat of any one of the local governments was, that it would be unduly influenced by the experience and views of the province in which it was placed. While recognising to the full extent the important influence of public opinion, he contended that the European and Native opinion by which the supreme government should be influenced, ought not to be that of any particular province, but the opinion of the whole of India. Another objection to Calcutta, Bombay and Madras, was that they were situated on low land near the coast, in a hot relaxing climate, unfavourable to continuous vigorous mental exertion, and that they were on the extremities of the empire. The practical effect of these last objections was, that the Governor-Generals were absent half their time from Calcutta—formerly without their Councils, which led to great evils; and now the entire government is removed twice a year, at great expense and inconvenience, between places as distant from each other as London and Constantinople. If these premises were correct, the conclusion was inevitable that in determining the seat of the new government the *sine qua non* was that it should be central—so situated as to be in the easiest and most direct communication with all the local governments, so as to supervise them with the greatest possible effect and with the fullest possible knowledge of what was going on. Mr. Campbell had seen the great importance of this question, and

had carried us a long way towards the solution of it. But the site selected by him was not sufficiently central, and he had not fully considered the question of public opinion, that it should be the public opinion not of Calcutta or Bombay, but that of the whole of India. He (Sir C. Trevelyan) therefore thought the capital should be somewhere in the centre of the continent, on the line of the Great Indian Peninsula Railway. The question had not arrived at the stage which required that any particular spot should be fixed upon. We shall be better able to judge after the stream of railway travellers has passed for some time between Bombay and Calcutta, and after the Government has instituted inquiries on the subject. But if he were obliged to indicate the proper position, he should name the high, healthy table-land of Central India, where the new capital would have Calcutta on the right and Bombay on the left, and would be in direct railway communication with Madras, Allahabad, Agra, Lahore, and other important places. Hitherto our policy had been to cling to the sea-coast, as a kind of citadel, and our influence had only partially penetrated into the interior; but now that the results of the mutiny had established our supremacy in the minds of the natives, and they had entered upon a course of European education and European civilisation, we should not be afraid of placing the capital of India in the centre of the country. It would establish in the heart of India a new focus from which English and Christian influence would radiate. It would be a strongly-seated powerful English colony, and would thus be an additional security and would contribute to prolong our rule.

Sir ERSKINE PERRY said the question had been on the *tapis* for the last twenty or thirty years. The objections to Calcutta were obvious. It was very remote, it was in a bad climate for Europeans, it was a long way from those climates that suited Europeans, and the consequence was a severance of the government from the capital during many months of the year. Still, the question recurred, and had not yet been answered, where to fix on a better site. The problem to be solved was this: in choosing a site for the capital of India you have to suit two very different habitudes—the conquering race who belong to northern latitudes, and the conquered race who belong to the tropics. What suited one did not suit the other. Calcutta was an admirable place for the Bengalese; but it was very distasteful and disagreeable to the European community. Still all the great things in India had been done there. There Warren Hastings lived and built up our empire, and there for the last hundred years all the great men who belonged to that part of India have passed their lives in the employment of their country. The outcries against Calcutta had been, therefore, much exaggerated. On the other hand, when men were sent out from this country, at forty or fifty years of age, they found the climate extremely they got away from it as soon as they could. He thought Mr. in some respects happy in the selection of a site. It was a central point, near to the sea, near to a large harbour and a large independent European community, and near to a range of hills where Europeans could find a suitable climate during the hot season, and have their residences there, just as many of the inhabitants of London had in the suburbs. The objection that occurred to him was that the plateau in question, like all the Deccan, is for the most part very barren. It is at an elevation of 2000 feet, with little rainfall, and therefore extremely dry: there are no rivers and no water to make the soil fertile. Mr. Campbell said that Nassik was full of springs, wells, orange-trees, and vines. That might be perfectly true; but these resources, which were sufficient for a limited population of a few thousand people, would not suffice for the population of the capital of British India. Moreover, all articles of food were 50 per cent. dearer in that part of India than in the fertile plains of Bengal. He was glad this question had been brought up in the Geographical Society, because it was desirable, as in most Indian ques-

tions, to turn the educated mind of England on topics of this description. As one who had passed his whole life in the consideration of Indian questions, he frequently regretted that this, the most magnificent appanage that ever belonged to any empire in the world, was so little understood, so little cared for, and so little thought of, by the inhabitants of England.

Sir HENRY RAWLINSON said it was impossible to exclude from the discussion all political considerations; but, at the same time, as members of the Geographical Society, it should be their endeavour to base their observations, as far as possible, on the geographical part of the question. Sir Erskine Perry had truly remarked that the whole question lay in a nutshell; it was a choice between Calcutta and somewhere else. Calcutta was in a very bad climate, it was in a corner of India, and it was the furthest removed from England of all the proposed sites. The importance of communication with England had not received sufficient attention. He did not mean telegraphic communication, but postal communication. Many of them might be aware that Bombay was in process of being made the postal port of India. It was the unanimous recommendation of a Committee of the House of Commons last year, and he believed arrangements to that effect were actually in the course of completion. This would make it almost a matter of necessity that the seat of the central government should be within a convenient distance of Bombay; and he agreed with Mr. Campbell that it should be some place above the Ghauts, in a good climate, and on the line of some great railway. But he was not prepared to desert a well-known station like Poonah in order to go eighty or ninety miles to the northward, and settle down in a desert like Nassick. We should lose prestige, and should lose, moreover, the advantage of all the necessary preparations for a capital which we have at Poonah. Ever since the battle of Kirkee, Poonah had been a great European settlement; it had gone on increasing from year to year, and it enjoyed at present a large amount both of English and native prestige. He should certainly vote in favour of Poonah in preference to Nassick. With regard to grapes, Poonah and the whole of the Deccan had its grapes equally with Nassick. In respect to climate, he did not think there was anything to choose between Poonah and Nassick. Sir Erskine Perry had observed that throughout the Deccan there was a difficulty of obtaining supplies. That objection would, no doubt, apply to all the proposed sites. But he did not see the necessity of the seat of government bringing a very large population around it. It was not the case at Washington, nor would it be the case here. There would be no commerce, like that of Bombay and Calcutta, nor any of those attractions for the native population which towns on the sea-coast presented. Therefore the question of supplies was not one of paramount importance. With regard to water, Poonah was better supplied than Nassick. There were two rivers which joined at Poonah, and furnished a supply of water amply sufficient for present necessities; while with dams and reservoirs the supply might be doubled or trebled. Then, in the vicinity were the hill forts of Singhar and Poorundhar, within a few miles of the cantonment, and possessing the best climate throughout the whole of the Deccan, much better, indeed, suited for European constitutions than the hills about Nassick. He knew Nassick only as a sportsman; he had never resided there, nor had he seen any sanitary reports of it. But he had heard that the jungles in the vicinity were unhealthy, whereas Poonah and its neighbourhood were notoriously healthy.

2.—*On the Inland Navigation of Travancore; an account of the Alipee Mud-bank and the Warkallay Barrier.* By C. R. MARKHAM, Esq., Secretary R.G.S.

THE backwaters on the Malabar coast of India form an inland water-communication traversing nearly the whole length of Cochin and Travancore, and continuous from Trivanderum to the railroad at Ponary, except at one point, the Warkallay Barrier. The author visited this spot in December, 1865. The barrier is formed by a spur of the ghauts extending to the sea, about 6 miles broad, with a summit-level of 180 feet. From the backwater on the south of the barrier a ravine runs up to within half-a-mile of the summit of the ridge, and from that on the north there is another ravine which also indents the side of the ridge. A plan for cutting through and tunneling the barrier, to complete the system of inland navigation in this part of India, has been proposed by the Travancore engineer and adopted by the Government.

The mud-bank of Alipee, the Port of Travancore, is a curious phenomenon. The safety of the roadstead arises from its possessing a remarkably soft muddy bottom, and the fluidity of the water being diminished by the intermixture of mud the anchorage is very smooth in four fathoms, even while the swell of the monsoon is at its height in the offing. Its formation, according to the explanation given by Mr. Crawford, the commercial agent of the Travancore Sirkar, is due to the hydraulic pressure of the waters of the backwater on the fine silt of the bottom, forcing it by subterraneous passages under the coast belt of land; the pressure arising from the level of the backwater being, during the height of the monsoon, four feet higher than that of the ocean. At low-water in this season a series of mud-eruptions are observed to form on the beach.

This paper, with illustrative Maps, will be printed entire in the Journal, vol. xxxvi.

Sixth Meeting, February 11th, 1867.

SIR RODERICK I. MURCHISON, BART., K.C.B., President, in the Chair.

PRESENTATIONS. — *Carleton L'Estrange, Esq.; D. MacLoughlin, Esq., M.D.*

ELECTIONS.—*Colonel Shafto Adair; George H. Wilson Brown, Esq.; E. Butler, Esq.; Rev. P. Butler (Rector of Ulcombe); Leonard Crane, Esq., M.D.; Charles John Ely, Esq.; John Langlands, Esq.; Guillermo*

E. de Marthin, Esq. (Consul-General of the United States of Columbia.

ACCESSIONS TO THE LIBRARY SINCE THE LAST MEETING.—*Donations.* 'Report on the Chemical Laboratories in course of erection in the Universities of Bonn and Berlin,' by A. W. Hofman, LL.D., F.R.S.: presented by the Lords of the Committee of Council on Education. 'Libro del Saber de Astronomia del Rey Don Alphonso X. de Castile:' by the Royal Academy of Sciences of Madrid. 'Notes on a Journey from Bida in Nupe to Kano in Hausa, in 1862, by Dr. W. B. Baikie, R.N.:' by the Foreign Office. 'Journal of J. G. Macdonald, Expedition from Port Denison to the Gulf of Carpentaria:' by the Colonial Office. 'A Journey to Ashango Land, and further penetration into Equatorial Africa,' by Paul B. du Chaillu, with map and illustrations: by the author. 'Index of 17 volumes of Bombay Geographical Society,' compiled by D. J. Kennedy: by the Society. '1619, Viaggi della Valle,' H. Pellegrino: by Mr. Gibb, F.R.G.S. 'Interoceanic Railroads and Canals—Reports to the U.S. Secretary of the Navy on Canals and Railways between the Waters of the Atlantic and Pacific Oceans,' with maps, &c., by R. Davis and G. Wells: by Admiral Davis, U.S.N. 'Comparisons of Standards of Lengths of England, France, Belgium, Prussia, Russia, India, Australia:' by the Secretary of State for War. 'Zeitschrift der Deutschen Morgenländischen Gesellschaft:' Dr. Ludolf Krehl. Eyles Irwin's work, 'A Series of Adventures in the course of a Voyage up the Red Sea in the Year 1717.'

ACCESSIONS TO MAP-ROOM SINCE THE LAST MEETING.—A Sketch-map showing the route of Mr. Colvill from Bushire to the Port of Lingah: presented by the Government of India. Plan of the English Settlement at Shanghae; published by the Municipal Council of Shanghae: presented by J. Pook, Esq., F.R.G.S.

The PRESIDENT informed the meeting that Lieut. Alwin S. Bell, who was stationed with his regiment (3rd West Indian) at Sherbro, on the West Coast of Africa, during the years 1864-5, had communicated to him a letter from the unfortunate traveller M. Jules Gérard, of which the following is a translation. The death of the traveller, by drowning in crossing the river Jong, took place within a month of the date of the letter, and Lieut. Bell adds that it was not known at Sherbro whether the capsizing of the boat was an accident or done intentionally by the natives:—

"Mano, Lat. 8° 10' N., 21 July, 1864.

"MY DEAR M. HUCHARD,—The first chiefs with whom I entered into relations, on my arrival in the Kasso country, having taken me some for a trader and others for a slave-dealer, all used their endeavours to retain me in their dominions, with a view either to sell me slaves or to induce me to establish myself among them. Actuated by these motives, they closed to me the routes into the interior, and concealed the fact that the Kasso people have

a superior chief,—a king without sceptre, but more feared and respected than a king. Having obtained this information towards the end of my sojourn at Matapen, I pretended to take the route of Sierra Leone, and thus on the fourth day of my march arrived at Mano, the residence of Bagon, the supreme chief I have spoken of. I was received by him in the most friendly manner. He showed me, soon after my arrival, the river Tayei, which is the principal affluent of the Mongray, and flows from the Kissi and Sangarah countries, forming two branches. The eastern branch traverses the Kono country, the western the Kouranko district. These two branches are navigable without interruption for eight days' journey above Mano, and their banks are as thickly populated as the Boum country, excepting the factories.

"Bagon has a great wish to have a factory, and with a view to this has given me most useful information concerning the productions of the country, such as cotton, palm-oil and palm-nuts, ground-nuts, ivory, and ebony. Ivory is very abundant here, and has no value. Bagon told me that if I was willing to stay with him he would send his troops to hunt elephants, which abound in his forests, and obtain plenty of ivory for the factory. Cotton may be obtained for 3*d.* or 4*d.* a pound, seeded and cleaned; that is, 4*d.* in goods at their value here, which is equivalent to 2*d.* on the coast. Rice and other products of the soil have no price. This locality being so desirable a situation for a trading post, I have decided to remain some time and make a trial of it. If my speculation succeeds, I shall fix myself here; if not, I shall only have to recover the payment for my goods, with the profits, and then continue my journey towards the north.

"I must not forget to tell you that, besides the road by water direct to Sherbro, there is a road by land which leads, in two days' march, to Matapen. To make a trial in trade at Mano I address myself to you. If my proposition suits you, have the goodness to despatch the first lot of goods, with an agent if possible. If you have not one at hand, I will employ in the mean time the interpreter whom I brought from Matapen, and who has for a long time worked at trading stations. If you send the goods, send Aly forward with a letter informing me of the probable date of their despatch and the route taken, whether by land or water. Whichever road you choose, Bagon will send his people to meet your messenger at Matapen if it is the land-route, and at Mongray if it is by water. As to the conditions on which you send the goods and receive produce in payment, you may fix your own terms. If my proposal does not suit you, let me ask of you to do me the favour of facilitating Aly's journey to Sierra Leone.

"JULES GÉRARD."

The PRESIDENT said the members of the Society must all lament the loss of M. Jules Gérard, who was present in that room shortly before his departure on the expedition which proved fatal to him. The country in which M. Jules Gérard was supposed to have been murdered was very little known to geographers. The project that he had in view at the time of his death was, perhaps, the most adventurous of any of the travels of modern times. It was no less than to proceed from the west coast, near Sierra Leone, to Timbuctoo, and thence to the French settlements in Algeria, where he had distinguished himself in former years as "the Lion Killer."

The following Papers were read:—

1. *Ascent of Mount Hood, Oregon.* By the Rev. H. K. HINES.

[Extracts.]

THE Cascade range of mountains is a northward continuation of the *Sierra Nevada* of California, and traverses the state of Oregon and

the territory of Washington from south to north, at a distance of 100 miles from the Pacific Ocean. This range springs up to an average altitude of 8000 or 10,000 feet, while, at intervals of many miles, more aspiring summits, from 5000 to 8000 feet higher, rise above the evergreen roofing of the lower mountains. The highest of these is Mount Hood. It stands about 50 miles south of where the Columbia has ploughed its way through the Cascade Mountains, and in the centre of that range from east to west.

In September of 1864, in company with three gentlemen of Vancouver, I first attempted to reach the summit of Mount Hood. On reaching an altitude about 800 feet below the summit, a dense cloud came sweeping against the north side of the mountain, and, drifting rapidly over it, instantly enveloped us in its folds. The air changed suddenly to a fierce cold. The driving snow filled the air so entirely that a cliff of rocks 300 feet high, standing not more than fifty feet from us, was invisible. To go up or to go down, was, for the time, alike impossible. One of my companions was chilled nearly to insensibility, but we struggled against the tempest for hours, unwilling to be defeated in our purpose to reach the summit.

On the morning of the 24th of July, 1866, in company with three gentlemen of the city of Portland, Oregon, I set out full of determination to stand upon the summit, if energy and endurance could accomplish the feat. Our rendezvous was at the house of a Canadian, who, fourteen years before, had erected a cabin at the place where the emigrant road leaves the mountains and enters the valley of the Willamette. From this place the track enters the mountains along the gorge through which flows a dashing river about 300 feet in width, which rises beneath the glaciers of Mount Hood. Up this stream we travelled for 30 miles, when, leaving the gorge, the way makes a *détour* to the south to gain the summit ridge. Here is the celebrated "Laurel Hill." For three or four miles the ascent is continuous, and in many places very steep.

Reaching the top of Laurel Hill we were on the general summit of the range: a comparative level of perhaps 10 miles in width, whose general character is that of a swamp or marsh. On this plateau is a dense and grand growth of fir, cedar (*Thuja gigantea*, Nutt.), pine and kindred evergreens, with an almost impenetrable undergrowth of laurel (*Rhododendron maximum*, Hook.). Straggling rays of sunlight only here and there find way through the dense foliage to the damp ground. Passing over this level we crossed several bold clear streams, coursing down from the direction of Mount Hood, and then, turning to the left, we took an old Indian

trail leading in the direction of the mountain. After a ride of an hour and a half up a continuous and steep ascent, we came to an opening of scattered trees which sweeps around the south side of the mountain. It was about five o'clock when we emerged from the forest, and stood confronting the wonderful body of rock and snow which springs up from the elevation.

We selected a place for our camp on a beautiful grassy ridge between one of the main affluents of the Deschutes River and one of the Clackamas, and which nearly constitutes the dividing ridge of the mountain. Having erected here a hut of boughs and gathered fuel for a large fire during the night, we spread our blankets on the ground and slept well until the morning. We picketed our horses in this place. At seven o'clock of Thursday we were ready for the ascent. For the first mile and a half the ascent was very gradual and easy, over a bed of volcanic rock, decayed and intermixed with ashes. Huge rocks stood here and there, and occasionally a stunted juniper found precarious foothold; some beautiful variegated mosses were also seen clinging to little knolls of sand. We soon reached the foot of a broad snow-field, which sweeps around the south side of the mountain, several miles in length, and extending upward to the immediate summit. The first part of this ascent is comparatively easy, being smooth, and only in places so steep as to render the footsteps uncertain. Near the upper edge of this field of snow the deep gorges, from which flow affluents of the streams Deschutes on the right and Sandy River on the left, approach each other and seem to cut down into the very foundation of the mountain. The waters were rushing from beneath the glaciers, which, at their upper extremity were rent and broken into fissures and caverns of unknown depth.

The present summit of the mountain is evidently what was long since the northern rim of an immense crater, which could not have been less than 3 miles in diameter. The southern wall of the crater has fallen completely away, and the crater itself become filled with rock and ashes overlaid with the accumulated snows of ages, through the rents and chasms of which now escape smoke, steam and gases from the pent-up fires below. The fires are yet so near that many of the rocks which project upward are so hot that the naked hand cannot be held upon them. Just at the south-west foot of the circular wall, now constituting the summit, and at a distance of near 2000 feet from its extreme height, is the main opening of the crater. From this a column of steam and smoke is continually issuing, at times rising and floating away on the wind, at other times rolling heavily down the mountain. Into this crater

we descended, as far as it was possible to go without ropes or a ladder. The descent was stopped by a perpendicular precipice of ice 60 or 70 feet high, resting below on a bed of broken rock and ashes so hot as immediately to convert the water, which dripped continually from the icy roof 100 feet above, into steam. The air was hot and stifling.

At this point the real peril of the ascent begins. It leads out and up the inner wall of what was once the crater, and near 1000 feet of it is extremely steep. The whole distance is an ice-field, the upper limit of a great glacier which is crushing and grinding its slow journey down the mountain far to the right. About 700 feet from the summit a *crevasse*, varying from 5 to 50 feet in width, and of unknown depth, cuts clear across the glacier from wall to wall. There is no evading it. The summit cannot be reached without crossing it. Steadily and deliberately poising myself on my staff, I sprang over the chasm at the most favourable place I could select, landing safely on the declivity 2 or 3 feet above it, and then with the staff assisted the others to cross. The last movement of 15 feet had considerably changed the prospect of the ascent. True, the *crevasse* was passed, but we were thrown directly below a wall of ice and rocks 500 feet high; down which masses, detached by the heat of the sun, were plunging with fearful velocity. To avoid them it was necessary to skirt the *crevasse* on the upper side for a distance, and then turn diagonally up the remaining steep. It was only 700 feet high, but it was two hours' sinewy tug to climb it. The hot sun blazed against the wall of ice within two feet of our faces, and the perspiration streamed from our brows, but on nearing the summit the weariness seemed to vanish, and with a feeling of triumph we bounded upon the pinnacle of the highest mountain in North America.

The summit was reached at about the centre of the circular wall which constitutes the extreme altitude, and it was so sharp that it was impossible to stand erect upon it. Its northern face is an escarpment several thousand feet high. I could only lie down on the southern slope, and, holding firmly to the rocks, look down the awful depth. A few rods to the west was a point 40 or 50 feet higher, to the summit of which we crawled, and then discovered that 40 or 50 rods to the east was a point still higher, the highest of the mountain. We crawled back along the sharp escarpment, and in a few minutes stood erect on the highest pinnacle. This was found to be 17,640 feet high, the thermometer standing at 180°, about 40 feet below the summit, when the water boiled—giving

32 degrees of depression. This estimate makes Mount Hood higher than any summit of Europe or North America.

The view from the summit was magnificent. From south to north the whole line of the Cascade Range is at once under the eye, from Diamond Peak to Ranier, a distance of not less than 400 miles. Within that distance are Mounts St. Helen's, Baker, Jefferson, and the Three Sisters; making, with Mount Hood, eight snowy peaks. Eastward the Blue Mountains are in view, and lying between us and them are the broad plains watered by the Deschutes, John Day's, and Umatilla rivers. On the west the piny crests of the coast range cut clear against the sky, with the Willamette Valley sleeping in quiet beauty lying at their feet. The broad silver belt of the Columbia winds through the evergreen valley towards the ocean. Within these limits is every variety of mountain and valley, lake and prairie, bold beetling precipices and graceful rounded summits blending and melting away into each other. It was with reluctance that at length we took the first step down the declivity.

The descent to the great crevasse, though much more rapidly accomplished, was quite as perilous as the ascent from it. We were now approaching the gorge, and a mis-step might precipitate us into unfathomed depths. Less than half an hour was sufficient to retrace the weary climbing of two hours, and standing for a moment on the upper edge of the chasm, I bounded over it where it was 8 feet wide. The impetus of the leap sent me sliding a long distance down the icy steep below.

In two hours and a half from the summit we were in our camp. At dark we began to pay the price of our day's work. The glare of the sun on the ice had burnt our faces and affected our eyes until they became so painful that we could not sleep. I kept on my eyes and face all night a cloth wetted in ice-water, and in the morning was able to see, but two of the party were quite blind for forty-eight hours.

*Olympia, Washington Territory, U. S.,
10th Nov., 1866.*

2. *A Journey across the Cascade Mountains into Eastern Oregon and a Description of Idaho Territory.* By ROBERT BROWN, Esq., F.R.G.S.

[Extracts.]

THE Oregon of to-day is not in geographical extent the same as previous to the Ashburton Treaty of 1846, when it was not very distinctly defined, stretching from the Californian boundary up to near

the Russian possessions. At that period all the country south of 49° N. lat., or the Straits of De Fuca, was declared to be United States' territory, and all north of that to the Russian boundary, or what is known as British Columbia and Vancouver Island, to belong to the crown of England.

Then, with increasing population flowing into the rich valley of the Willamette, the territory of Washington in 1853 was separated from Oregon; but, what with Indian wars and other adverse circumstances, its population has somewhat decreased, and does not number more than between 11,000 and 12,000. The country east of the Cascades is thinly populated, save by Indians, and the region to the west of that range is for the most part very thickly wooded, and in some cases very wild and inaccessible.

The territory of Idaho ("Star of the Mountains") was organised out of portions of Washington, Nebraska, and Dakota. For the most part it is a mere desert, and, with the exception of the rich bottoms of the numerous rivers, the wealth of the country consists in the gold and silver mines. It is terribly harassed by Indians, little explored, its civilised population very floating, estimated at about 22,000, and its area about 326,333 square miles. It is a rich mining region, and is likely eventually to become of importance. Three years ago a portion of California, comprehending the region of the Sierra Nevada and the great silver-mines of Washoe, was erected into the state of Nevada. We must not, however, allow ourselves to be misled by the division of these wild countries into counties, &c.; some of the counties having no population, or so little as to be of very small moment, and not a few of the "cities" consisting of a tent, two dogs, and a bob-tailed horse,—as a city which I discovered on the Columbia River last summer did! The state of Oregon proper contains about 60,000 people (a portion very migratory), and an area of about 82,248 square miles, or 60,958,720 acres. This population is principally contained in the beautiful valleys of the Willamette, Umpqua, Rogue River, and Lower Columbia, to the west of the Cascades, and in the little towns on the Upper Columbia to the east. Portland,* on the Willamette, with 8000 inhabitants, is the largest town.

Magnificent steamers navigate the Columbia, with occasional breaks, into the British possessions, and the Willamette at all seasons to Oregon "city," 10 miles above Portland. At high water they navigate the river above the falls for between 200 and 300 miles, to a few miles above the town of Eugene.

* Salem, a small town (lat. 44° 56' 51" N, long. 122° 53' 43" W.) is, however, the capital.

The whole country east of the Cascade Mountains is very wild, inhabited almost entirely by wild tribes of Indians, and it was over this tract, described on maps as "unexplored," that the descriptions contained in this paper refer. I may explain how it was that I am the historian of it. In July, 1865, I arrived with my Indian servant at Eugene city (lat. $44^{\circ} 2' 44''$ N.), in the valley of the Willamette, a very out-of-the-way place at best. For the whole summer (indeed, for several summers past) I had been leading a vagabond sort of life among the Indian tribes in the wild country on the Pacific slopes of the Rocky Mountains,—now an explorer, now a naturalist, at one time leading an extensive exploring expedition, at another wandering all alone through the solitary valleys and by the banks of mountain streams.

I proposed from Eugene to cross into the wide region to the east of the Cascade Mountains into the Snake Indian country, confident that my long familiarity with Indian character would render my solitary journey as safe as it had hitherto been from these wild rovers; but on mentioning the subject to my gallant friend General Applegate, I was assured (only in a much more expressive manner) that if I had ten lives and the same number of scalps, instead of only one, I should have barely enough to pay my "footing" in that region! At the same time, for my consolation, I was informed that a party of dragoons were about going over that region as an escort to some gentlemen interested in an attempt to find a route over Eastern Oregon to the territory of Idaho, and that he would use his influence to allow me to travel under their escort.

Thus I travelled to Fort Klamath, where I left the party, and reached Southern Oregon. The rest proceeded over the country to Owyhee River, on much the same track as that explored by Colonel Drew in the preceding year.

In California there are published a number of maps, comprising some attempt at portraying the explored parts; but these are only ephemeral productions, brought out often at great expense to illustrate some newly-discovered gold-mines, and as they are after the collapse of these forgotten, they may be said to be almost unpublished. They are—'Map of the Mining Sections of Idaho and Oregon, showing the Gold and Silver Mines of Bois  and Owyhee, by George Woodman; compiled chiefly from notes of his travels and surveys during the last 18 months' (San Francisco, A. Censoul, 1864) 'Bancroft's Map of Oregon, Washington, Idaho, &c.' (Bancroft, San Francisco, 1864). 'Map of the Territory of Montana with portions of the adjoining Territories, showing the Gulch or Placer Diggings actually worked and Districts where Quartz (Gold

and Silver) lodes have been discovered to Jan. 1st, 1865, drawn by W. W. De Lacy for the use of the first Legislature of Montana' (Censoul, 1865).

On the 17th of July the whole party left the little frontier village of Eugene "city" amid the cheers of the people. For two pleasant days our route lay among the outlying settlements of the Willamette, among rounded knolls, or as they are called here "buttes,"* with neat little primitive farms at the base of rocky bluffs, where rough voices hailed us cheerily.

The country was well watered and well wooded, and many were the roaring mountain-creeks we had to cross or swim. Our daily routine was much the same. At daybreak the bugle sounded; then reveillé; all commenced packing up, and the cooks prepared our modest breakfast, of which the inevitable pork and beans formed the staple: the horses were then driven up, every man lassoing his own and saddling it. Then the mules were packed with the usual ejaculations in Spanish and English. Our march was rarely prolonged beyond midday, often camping much earlier, to allow of the overloaded train resting, for the grass, or for convenient camping-places. We spent the rest of the day reconnoitring the neighbourhood for plants, fishing in the mountain-streams, hunting deer through the long, dank, wooded dells, or sleeping under a bush, each as his own individual penchant inclined him, the bugle calling us back to camp for supper; after which each man rolled himself in his blanket under his own particular tree, until the cheery bugle again woke us at daybreak, to make our toilet in those grey misty summer mornings by the banks of some nameless stream, and then to resume our march. The road (such as it was) became worse and worse. We rode through timber and in sight of the middle fork of the Willamette, gliding along between wooded banks of pine and cedar and summer green-leaved maple.

On the 19th we travelled through cañons and thick woods, over many small creeks, and by the banks of the river, with no cultivation. Next day our route lay through dense timber, and after passing a party of Indians making the trail we had to drive our horses before us, scrambling over fallen trees and among rocks up steep inclines, until we came to a point which was named "Point Look-out," where we had great difficulty to get our horses over. Here we encamped, driving our horses across the river. The next eight miles we marched through wooded

* A useful French Canadian voyager's term to express a rounded elevation too low for a mountain, but too high to be called a hill. This distinction is, however, not strictly adhered to: e.g., Shasta Butte (more than 14,000 feet).

river-bottoms. Swam the river again; climbed a steep mountain trail (for we were now entering among the hills of the Cascade Mountains) and emerged into a beautiful prairie valley, shut in by mountains, but covered with grass, a good creek flowing through it, and with shady woods on the border, so that one might fancy oneself in the "Happy Valley" of Rasselas. The next two days the country was similar, and we encamped (after travelling five miles) on a little prairie.

On the 24th of July the trail lay through woods of fine timber, white and red cedar, and we now noticed for the first time the stately sugar-pine (*Pinus Lambertianus*), the sweet exudations of which are one of the hunter's cathartics. A rhododendron and a honeysuckle (*Lonicera Douglasii*) added variety to the sombre woods, hitherto diversified only by an undergrowth of berry-bushes—the bright salmon-berry flowers, the more modest thimble-berry (*Rubus divaricatus*), and the waxy sal-al (*Gaultheria*), forming an undergrowth like a carpet throughout the woods, and a sure sign of poor stony ground. The stately alder (*Alnus oregonus*), with its dark-green leaves, affected moist ground everywhere, and the hemlock (*Abies Bridgesii*), most graceful of all the north-western conifers, began to disappear from the woods, the silver fir (*Picea grandis*) supplying its place. Now and then we would break through thickets of the mountain laurel (*Ceanothus velutinus*), sending an almost overpowering fragrance from its glistening leaves as we trampled it down under our horses' feet. Amid these pleasant scenes we had a day of disasters; two mules with their loads had rolled over a precipice and were dashed to pieces, and another, after rolling *end over end* (after the manner of mules), had survived and brought its load into camp. Part of the loads were recovered, but a side of bacon up a Douglas pine-tree will remain as a monument of the passing of the first expedition through these mountains. Some emigrants had attempted it in 1853, and we could yet see remains of their disastrous trip, in which some of them died of starvation.

Our track had hitherto been always in a general south-east direction, and to-day it lay by the banks of the middle fork—seeing little but woods and wooded hills of the pass. We saw signs of bears, wolves, and panthers. Deer were seen, and trout abundant. The rocks were all volcanic (trap), and the soil sandy, and, with the exception of the wooded river-bottoms, little fit for cultivation.

We travelled 14 miles before camping, over a fair track with a creek some part of the way, and latterly leading over a country with many steep places, where we had to ride by an almost perpendicular path. In one of these wooded gulches we were met by

a number of Cyuse Indians and a white man, all dressed in most gorgeous array of buckskin and beads, crossing for horses to the Willamette country. The scenery was here very fine. On every side bold wooded mountains, with the headwaters of the Willamette sparkling between the trees, and the snow of Diamond Peak in the distance. On the 28th, after every preparation being made, we commenced the passage of the Cascades into Eastern Oregon. The ascent was comparatively easy, crossing over many mountain-creeks, through woods, where I saw many trees of a species of yew (*Taxus brevifolia*), until the elevation began to be perceptible in the flora,—plants which were long ago in fruit in the valley were here in partial flower, until, as we gained the summit, they were in full bloom. Thickets of rhododendrons with their huge bunches of pink flowers stood out in fine contrast to the drifts of snow, giving one a faint idea of the splendid rhododendron thickets in Sikkim Himalaya, so graphically portrayed by Dr. Joseph Hooker. Occasionally a magnificent species of mountain lily would bloom by the side of some beautiful saxifrage, and the shrubbery of the Ceanothus would add fragrance to the mountain air. The scene from the summit of the pass (4441 feet*) was grand in the extreme. The bold crags of the Diamond Peak with its old crater, and the “Three Sisters” appeared to the north, and on the left, away to the south, the tops of Scott’s Peak and Mount Williamson; while the wooded valleys and lesser heights of the Cascade Range lay below, and off to the east the long slope of flat, wooded country, with the peaks of the “Three Brothers,” the only break in the monotony of the view. Drifts of snow lay in shady places, and green grassy spots formed halting-places by the side of mountain-streams. Now and then a beautiful mountain-lake, unsuspected before, lay glistening in all its quiet beauty in some unbroken valley. As we began the descent a marked change was apparent in the country. Instead of moist woods, our route lay by an easy descent through groves of a pine thickly scattered over that country (*P. contortus*), encumbered with no undergrowth, and the soil a mass of volcanic ashes and pumice-stone. At 2 p.m. we were right glad, after a weary ride of 26 miles, to reach the headwaters of the Deschutes or Falls River (lat. 43° 27' 22" N.). Deschutes River arises by several forks, some of which take their source in the marshes, another in a lake, which we named “Summit Lake” (we had seen it on the right hand in descending) that communicates by a small creek with another 16 miles in length, lower down (named “Crescent Lake”); and this

* This was from the observations of Mr. Byron Pengra, late Surveyor-General, Oregon, and may, I think, be relied on.

is again connected with a third among the mountains, styled, in honour of one of the party, "Lake Oddel." Our camp here was 1200 feet below the summit.

Hérons, cranes, and grouse were abundant near the river, but otherwise few birds were seen in this solitary region.

On the 29th of July we began to direct our course in an E.S.E. direction over a level desert flat, with a soil composed of volcanic ashes, and thinly scattered with a forest of *Pinus contortus*, a scrubby-looking tree at best, abounding in resin. To the east and north-east lay a long stretch of flat land, probably 90 miles' breadth, of a similar character to this, but which we found to be impracticable to traverse on account of the almost entire want of water in it. The creeks flowing from the Cascades being lost in "sinks" before going far into this desert track. The "Three Brothers" are the only breaks in this nearly level landscape in that direction, and the snow peaks of the Cascades gleaming through the trees diversify the view to the right, and now and then a cool breeze tempers the hot summer's day as we slowly in long file traverse this wild track. After a march of 11 miles we halted on a branch of the Deschutes River, where we found a tolerably good tract of meadow-land in the immediate vicinity of the river. Deer were plentiful, and the beautiful little humming-birds flitted about among the few flowers which the invigorating moisture allowed to spring up here and there among the long swampy grasses. On Sunday, the 30th July, the track was much as before, only more hilly and varied.

Hitherto, though a sharp look-out had been kept, we had seen no Shoshones Indians, but this evening our scouts came in with very long faces, describing the great moccasin-tracks crossing our trail after we had come into camp, and as every one knows that this was the "sign" of that tribe, we slept with only one eye shut. It was only on our arrival at Fort Klamath that we learned from the Indians there that we had been dogged by three lodges of Snakes the whole of our journey, seeking an opportunity to "stampede" our horses or capture an odd scalp or two, when it could be done without the disagreeable accompaniment of running their heads against a leaden bullet. Once as we crossed Fremont, the "Pathfinders'" trail, the tracks of mocassins and "barefooted" (unshod) horses, with camp-fires not extinguished, began seriously to alarm us. However, we afterwards found that it was the Superintendent of Indian affairs for Oregon on his way with his band of Cyuse scouts to try and make a treaty of peace with Pah-ni-ne.

On the 2nd of August, after travelling 10 miles, we came to a straggling creek with a great extent of rich grasses by its borders,

but the soil very poor and sandy. We named this stream, the only one for several miles, "Rifle Creek." Scott's Peak was here directly abreast of us, and is a truncated cone of a peculiar form. On the morning of the 3rd of August we were early astir, and, after a march of 7 miles, turned down again to a beautiful prairie near the Klamath Marsh, where the party lay over for several days, and the animals revelled in a paradise of clover. We could see Indians in canoes gathering the pods of the yellow water-lily on the marsh, and tracks of grizzly bear did not make our woodland botanizing anything the pleasanter. Here I bade good bye to my gallant *compagnons de voyage*, from whom I had received so many kindnesses, and, accompanied by Lieut. M'Call and an escort of six troopers, rode over the ridge to the westward, to a fort recently established in Klamath Basin, and supposed to be distant between 15 and 20 miles. We had a pleasant ride over a low ridge—a spur of the Cascades—through a fine grove of yellow pine (*P. ponderosus*), where we shot a skulking coyote wolf (*Canis latrans*, Sag.), and then, descending into a valley where Indian sign was plentiful, until from an eminence the lovely prairie of Klamath Basin—shut in by snowy mountains with cold rivers meandering through, and studded with groves of trees, like wooded islands in a sea of grass—burst upon our astonished view, so long accustomed to the arid tract we had been passing over. We crossed the "Fort Creek," a stream of icy-cold water (which springs out of the ground in one torrent), our horses almost hidden amidst the luxuriant herbage, and then through a mile or two of country which it required recollection of where we were not to suppose some old English park; we arrived at the fort, covered with dust and most unpresentable figures. The valley of Klamath Basin is excellent soil, but cold springs come down from the mountains and render the subsoil so cold that cattle cannot subsist here in the winter, and garden produce, with the exception of beets and turnips, does not come to any size. Down by the borders of Klamath Lake and Sprague's River the snow lies only a short time, and there the Indians winter their stock.

The Snake or Lewis Fork of the Columbia River is navigated during the few weeks of high water by a steamer as high up as Lewiston (so named from the celebrated explorer), but from recent explorations it is found that the valley is entirely different from the mouth of the Boisé down to Old Ferry from what it is below. There is said to be no Snake Valley above Boisé and Owyhee rivers, the Snake, winding its way around low alkaline hills which bear only sagebrush; and there being no grassy bottoms or islands worth

speaking of, only clayey banks of almost dazzling whiteness, the district offers no inducements to settlement. The river is from 200 to 400 yards wide, deep at its mouth, and free from "ruffles;" the current averaging the strength of the Columbia between the Dallas and the Cascades. The Owyhee and Boisé rivers, which debouche into the Snake within a short distance of each other, sensibly increase the volume of water. The limits of this paper being our own personal explorations, it would be out of place to attempt any laboured geographical description of the country outside our track, however little known or (what is worse) erroneously described, yet I cannot leave the Snake River without mentioning the magnificent waterfall discovered on the upper reaches of it. We have received from one of the discoverers a trustworthy account of these grand falls. They were discovered by a detachment of troops scouting in the valley of the river in 1863. The entire volume of the Snake pours over a sheer precipice of 198 feet, 38 feet higher than Niagara. The locality of this immense waterfall is near the point hitherto designated as the Great Shoshow, or Salmon Falls, of that river, but they have always been enveloped in mystery. For hundreds of miles across that great plain, Snake River flows through a cañon with vertical walls. The route crosses from point to point of the bends, only approaching close to the river where there is a chance to descend to the water. From these facts few, if any, of the many adventurers that have "crossed the plains" ever looked upon the Great Falls. The discoverers report, besides the main cataract, many others of less height, varying from 20 to 50 feet each, near by.

The Boisé basin comprises the principal mines which have been discovered in and about the middle portion of Idaho territory. It lies in near lat. 43° N., and is surrounded by very high mountains, from which waters flow into the tributaries of the Snake, the Colorado, and the Missouri. Jefferson's Fork being the principal tributary of the Missouri, Green River of the Colorado, and Snake River of the Columbia. On this stream but little mining has been done, the gold being generally so fine that little exertion has been made to save it: there being good mines near at hand in the basin, and wages rating high. This, together with the fact that sufficient water can only be had about three months in the year, has impeded the progress of mining. Boisé basin may be estimated as being about 25 miles long and 10 miles wide. The gold is not found in strata of earth or gravel, but in leads, many places being marvellously rich; others (as is too often the case with gold-diggings generally) not paying the expense of working. This is

true of all gold mines, that while one man is making a fortune, fifty are ruined: indeed, out of the hundreds of gold miners whom I have known, I cannot recollect ten who have earned more by gold mining than they would have done by any other quieter and less laborious employment in the same country. In this basin there are four villages:—Idaho City, the capital, is the largest; Pioneer City, the second; Placerville, third; and Centreville, fourth. Pioneer City is better known as "Fort Hog'em." Granitic rock forms the basis of these mountains, and is what the miners call the "bed-rock." By sinking down, deposits of washed boulders have been found to a depth of 90 feet. The hills are composed of syenite or granite, blue, whitish, and grey, with occasional eruptions of basalt, serpentine and trap, with strata of metamorphosed clay-slates, and when felspar prevails the soil is generally loose and rich in gold. The quartz veins, running N.W. and S.E., vary in width, and prove rich on the surface, evidently showing that the gold in the creek, &c., has been disintegrated from them. In many of the ledges, pyrites of iron, antimony, copper, galena, sulphur, arsenic and bismuth occur. Some of these metals are plentiful, but are obnoxious to the quartz millmen, as it is impossible to work the gold-bearing rock sufficiently fine for successful amalgamation, when having to contend with these baser metals. The valley of Boise River has two benches or raised terraces. The lower shows marks of inundation, and is in places moderately fertile. The upper is dry sandy soil, with no available ground to cultivate at all. The valley is only calculated to raise vegetables enough to supply the mining camps around. It will never yield a large quantity of hay or grain. Last winter (1864-5) the thermometer sank many degrees below zero. The rivers are belted with cottonwood trees, but not heavily. The confluence of the Boise with the Snake River is about 40 miles below Boise "City."

The PRESIDENT informed the meeting that Mr. Brown, who had brought Mr. Hines' paper to England, and enlarged it by remarks of his own, was a most able botanist, and had travelled for several years in the countries of western North America. He had himself witnessed Mount Hood in a state of activity. With regard to the subject of the paper, the meeting would recollect that some years ago, Mr. Brown had traversed the Cascade chain, in his explorations of the then almost unknown Pacific regions of North America. The route taken by Mr. Brown, as described in the paper, was, however, quite a new one, and the ground traversed different from that described by Fremont. The paper was a long one, and composed of several distinct narratives relating to the country between Oregon and the territory of Idaho, but the remainder of it could not be read that evening.

Mr. Brown said that the Cascade range of mountains traversed the British possessions, Washington Territory and Oregon, from north to south, and were a continuation of the Sierra Nevada of California. Further to the south, the

ranges were connected by the spurs of the Siskiyou. The range was more important even than the Rocky Mountains, as far as concerned the physical geography of North America, because, while the climates on the immediate eastern and western sides of the Rocky Mountains were very similar, and the plants and animals almost identical, the plants, animals, and climate on the sides of the Cascade Mountains were very dissimilar. The soils were also totally different in character on the two sides of the range. The soil on the western side was rich and fertile, and a portion of it was thickly wooded. Many districts were cultivated, and in fact almost the whole population of Oregon, comprising 50,000 or 60,000 people, were found in the valleys of the west; whereas, on the eastern side the soil was poor and the country arid, and there was no cultivation except in such valleys as that of Deschutes, which was well watered. The cause of the western side of the range being more fertile than the eastern, was that the mountains caught the warm breezes from the Pacific, and precipitated the moisture over that region. The Cascade Mountains had all been more or less active volcanoes, and some of them were active to this day. He had occasion in exploring the range to visit the old craters, and he found that several of them had deep lakes like the Gemunder Mäar in the Eifel, the Pulvermaar, the Murfel der Maar, &c. Mount Hood was an active volcano. In October, 1865, there was a severe earthquake in California, which was felt all over the west coast. He had occasion to make, with the assistance of a friend, some observations upon this mountain near the Columbia River. He arrived there in October, just after the earthquake, and though he himself did not see any eruption in which fire was visible, yet his friend observed some flames. On the day after their arrival they saw smoke issuing from the mountain in large volumes, and in the afternoon of the same day there emerged large volumes of steam, occasionally mixed with black smoke. The next day the emissions consisted almost entirely of steam. This steam formed into clouds, and drifted away to the horizon. The day following that was wet, probably in consequence of the steam which had escaped from the volcano. During the following winter, the snow covered the whole mountain, and Mr. Hines' ascent was made after that. But in the summer of 1866, black smoke was again seen issuing from Mount Hood. He had just received a letter from the North-west Coast, stating that on a very clear day smoke had been seen recently coming out of the mountain. Mount Rainier was seen in eruption in 1842; and Mount St. Helens in 1842 sent out showers of ashes, and General Fremont mentioned that he saw some of the ashes. In reference to Mount Baker, that mountain could be seen very well from the town of Victoria, Vancouver Island, and the colonists viewed it with very great pride. Its height had not been exactly ascertained, but it was supposed to be between 10,000 and 11,000 feet. He made an attempt to ascend it in August, 1866; but, after going for five days into the interior of the country, the Indians would not allow his party to proceed; but some of the party afterwards succeeded in reaching nearly to the summit, and saw streams of lava. In 1863 flames were seen coming out of Mount Baker; and he was told by Sir James Douglas that in former years he had seen flames issuing from the summit. He (Mr. Brown) was told by trustworthy observers that, in the summer he ascended, flames were seen at night, but the eruption was not of a very decided character. He had seen lava and pumice-stone in the adjacent stream.

Mr. DALLAS, late Governor of Prince Rupert's Land, said he agreed with the general description of the country given by Mr. Brown. He had, however, been rather amused by the apprehensions entertained by the American officer of an attack from Indians, and by the commanding officer warning Mr. Brown, on entering the country, that he would have need of ten scalps. He (Mr. Dallas) had traversed a large portion of the country, and

travelled amongst the most hostile of the Indians, namely, the Blackfeet and the Sioux, without any fear. He wished to call attention to the remarkable fact that all over North America, wherever the British rule prevailed, there had been scarcely any instance of disturbance or collision with the Indian tribes. He did not think that could be said of any other part of the world where we had come into contact with the natives of the country; he could instance the Cape of Good Hope and New Zealand. He attributed this exceptional result in the case of the North American Indians to the tact and management of the early pioneers who inaugurated the system, which had been always maintained by the Hudson's Bay Company, namely, under all circumstances to maintain friendly relations with the Indians. Even in cases where aggressions and raids had been made by them, though we had always punished them, yet we had done so in accordance with their own ideas and customs, and had generally been successful in carrying their convictions with us. This fact of the immunity of British subjects among the tribes of the Indians was remarkable, and spoke very much in favour of the management of those who have had the rule of the country; while, as regarded Americans, it had never been safe for anyone to travel the country as an American.

Sir EDWARD BELCHER said he must congratulate the Society on receiving a paper from persons who had been brave enough to ascend the snowy peaks of the Cascade Mountains; but he should have felt much better satisfied if the paper had given the data upon which the altitude of Mount Hood had been deduced. Passing up and down the Columbia River he had seen these mountains, but, as far as his own estimate went, he should consider that Mount St. Elias, which he had also seen, was infinitely higher than the mountains of the region described. There could be no question about that.* St. Elias was the father of the icebergs of that icy sea. The ice had been seen slipping down the mountain, and actually calving its bergs into the sea. At the time he passed Mount Hood it did not strike him as a very lofty mountain. He estimated its altitude from Fort Vancouver, having no second position which would give a proper basis for determining the height; but one curious fact was that Mount Hood was not seen from the sea. It was not so high as to allow of its being seen over the outer ridge of mountains, and therefore he could not imagine that it was of the altitude which had been stated. He could most clearly bear out all that Governor Dallas had stated with regard to the safety of British subjects among the Indians. He (Sir E. Belcher) had done a great work which he had published, the case of a hunter named McLeod, who, with no company but his wife, travelled right through the mountains to the Indian settlements and back again, without any harm happening to them. Some Americans who followed and attempted the same route, not being British subjects, were stopped, and, he believed, murdered by the Indians. Signs of former volcanic action had long ago been observed near the mouth of the Columbia River, in the great quantities of pumice-stone found there, and as far as the sandy beaches extended. The River Willamette was the centre of the district in which the Governor of Vancouver Island had allowed a party of Americans to establish themselves in 1838 or 1839. It was a very rich country. He had no doubt that the Western coast, wherever the sea-breezes reached, would prove well adapted for cultivation. He very much doubted that any of the land on the Eastern side would be productive. For instance, on the banks of the Sacramento, for a distance of upwards of 96 miles as the crow flies, although the banks were alluvial and there was a great depth of soil, nothing would grow except the coarsest grasses.

Mr. CASELLA stated that the deduction made with regard to the altitude of

* No decided determination of the height of Mount St. Elias has been arrived at: whence then the assertion that Mount Hood is higher?—E. B.

Mount Hood, by the author of the paper, was correct, if the data were correct. It was stated that on the summit of Mount Hood the temperature of boiling water was 180° . That would be equal to about 16 barometrical inches, each inch being equal to 1000 feet, which would give an elevation of about 17,500 feet. If the instruments used were correct, there could be no doubt that the elevation would be as near as possible what had been related.

Sir EDWARD BELCHER replied that, with a set of instruments specially adapted for observation of the boiling-point, it was found that the calculations were in some cases as much as 2000 feet in excess, as compared with trigonometrical survey.

Mr. CASELLA said that there might be variations and deviations; but the thermometer as an instrument for measuring altitudes stood inferior only to the barometer itself, besides the advantage of being so much more portable.

Mr. W. L. BOOKER (Her Majesty's Consul at San Francisco) said that about fifteen or sixteen years ago California was the only part from which the gold of North America was exported. At that time the quantity of gold received at San Francisco probably amounted to twelve or thirteen millions. California did not yield nearly so large an amount as it did now. An enormous amount of territory opened up by gold miners and others afforded a larger total yield of gold than was produced in California ten years ago. He had no hesitation in affirming that the quantity of gold yielded on the western slope of the Rocky Mountains was more now than it was seven or even ten years ago. A great deal more was absorbed in the country itself; but the exports from San Francisco were about as large as they ever were. From its geographical position, San Francisco must always be the port for the whole of the western part of North America.

The PRESIDENT asked whether the region which was so particularly auriferous in the first instance had not been pretty well exhausted of gold.

Mr. BOOKER replied that the Placer mines were all nearly exhausted. The gold was now got in California from quartz mines and from the mountains by washing them down by hydraulic pressure, and although the yield was probably very small to the ton of earth, still by the use of a huge pressure of water thousands of tons could be washed with the same facility as 50 or 100 tons formerly. He could not speak of the gold yield of the Cascade range of mountains; but in 1859 silver was discovered in the Nevada territory. He believed that about 2,400,000 pounds sterling was the average produce of the Territory (now State). There was an intermixture of gold with this, and the metal was worth on an average about 20s. or 24s. the oz. From Idaho, Washington Territory, and British Columbia, between three and four million pounds sterling of gold and silver, but chiefly gold, were annually brought down. Oregon had always been a very good agricultural district; but not being so thickly populated as California, the produce was not so large. Twelve years ago California was an importer of grain; but this year they had nearly a million quarters of wheat for export over and above the wants of the country. The oats produced in Oregon were unquestionably the finest in the world. He had seen oats weighing 52 lbs. to the bushel brought from Oregon by the ship-load. The barley was not so good either in Oregon, California, or Washington Territory. It was what would be termed in England "grinding barley," although it was used for malting. Gold had been discovered on both sides of the Rocky Mountains: it came to San Francisco from the west slope, and not from the eastern slope at all. Montana, Washington, Oregon, Idaho, down as far as the Mexican frontier, were all more or less gold-producing. In the southern part of the State of California, 150 miles south of San Francisco, almost all agriculture ceases. That was a grazing country, but not so good as had been supposed, owing to its being subject to great droughts: three or four years ago more than half the cattle and a third of the

sheep were destroyed by this cause. The Sacramento Valley, and to the south of San Francisco, a district pronounced many years ago by Governor Douglas as unfit for growing grain, were very fertile, and the latter had proved of late years to be the very best grain-growing country. He (Mr. Booker) had seen lands, not more than 60 miles from San Francisco, which had produced 80 bushels of wheat and 120 bushels of barley and oats to the acre. A portion of the country consisted of steppes. The district near the sea produced the largest returns, and the land gradually became less fertile the higher it was, until at last it was fit only for grazing land. The neighbourhood of the geysers was the finest agricultural country in the world, consisting of narrow valleys, with rivers or creeks running through them. These valleys afforded magnificent views to those who were in search of scenery, and plenteous crops to those who were in search of the rewards of husbandry. Last spring he ascended Mount St. Helens, near the Geysers. The height was about 4600 feet, and the ascent was very easy by means of a pathway through the brushwood. The top of the hill was a region of stunted pines, not one of which exceeded 10 feet in height, and bearing large cones. The top of the hill afforded a view which he did not think could be easily surpassed.

ADDITIONAL NOTICE.

(Printed by order of Council.)

On the Sources and Course of the Lycus and other Rivers in Kurdistan.
By J. E. TAYLOR, Esq., Her Majesty's Consul at Diarbekr.*

(Communicated by Captain FELIX JONES.)

MY DEAR CAPTAIN JONES,—

Feb. 2, 1867.

I send you a rough map of my last journey and routes from Erzeroum to Kára Hissar round to Arab-Kír; thence to Khozat and through the Deyrsím to Kamach and Erzingán; from there again, but by another line, through the Deyrsím to Khozát; thence to Mazgerd or Hormuzgerd on to Peyrtek and Kharpút.

The interest of this route consists in my having satisfactorily traced the Kalkyt, or Kara Sú (the Lycus), from its source down to the point where it is known near Koinloo Hissar, as also its principal tributary the Koát or Khar Hissar Sú. The real source and early course of the Kizzil Irmák or Halys has also been visited and fixed. It rises at the foot of the high centre peak of the Kizzil-dagh; hence its name. Subsequently I followed the Mezoór Su and the river of Tchimishgezek, both of which are one with the Ohigneýr Su, and they are now for the first time laid down with something like exactitude. Independent of these new notices, I think I have supplied a tolerably correct sketch of a great part of the Deyrsím Dagh, a range of huge mountains only to be penetrated at three points from the north, viz.—by the narrow passes of the Ziáret, Harámí, and Merján Bogházi. The first I followed on my way to

* The details of Mr. Taylor's discoveries, with his map, will be published in the Journal vol. xxxvii.

Kamach, and the last on my return from Erzingán to Khozát, Mazgerd, and Kharpút. The old town of Saddak, which lies near the head of the Lycus, is interesting, and has not yet been visited or described; nor was the site of Pompey's Nicopolis finally determined before. But a Roman milestone which I found near it (the modern Purk) at Ak-Shéhr, fully settles that point as well as identifies the rock and old ruins of Kara Hissar as the last place of refuge of Mithridates when flying from Pompey previous to escape into Colchis. It is certainly either that place or the old Dasteira. (See Strabo, Book xii. cap. 8.)

The above are only a few of the more salient matters of interest which present themselves in a journal too copious for me to arrange at present. Nor can I say anything here on the extraordinary Kizzil-bash race, their customs, religion, and language, as these topics require more time than I can spare from official routine. You will observe that the country covered by my map is that part (from $38^{\circ} 40'$ N. lat. and $39^{\circ} 40' 30''$ E. long.) left bare in Kiepert's last map of those parts. It is right to note that my predecessor, Sir R. Dalzell, performed part of the route between Kamach and Halvoree Vank before me; but I do not think he has preserved any data for laying down his travels.

One word more as to the map. According to my bearings, Erzingán is no less than 21 miles north of the Kara Sú or Erzeroum branch of the Euphrates. But, after reading what I now offer as to the fixed data which serve as bases to my work and the matter of it, with the subsequent issue, I think you will be disposed to say that I am right and Kiepert wrong. In the first place, Erzingán has never been astronomically fixed; Erzeroum, Kara Hissar, Arab-Kír, and Kharpút have; and those points were my guides. My work was planned every evening from bearings and angles taken at every turn of the road; the pace of my horse had been ascertained from twenty measured and timed trials in the Erzeroum plain, and during every week of my journey. The pace of laden mules—which rarely varies—was also regularly noted between stage and stage. In this manner my observations were only 2 miles out on arriving at Kara Hissar, 3 miles at Arab-Kír, and 3 miles at Kharpút; on all occasions that error was east of the fixed positions. The work was done in three portions, with a fresh starting-point for each.

1st. From Erzeroum to Kara Hissar.

2nd. From Kara Hissar to Arab-Kír.

3rd. From Arab-Kír to Kharpút.

The above portions are embodied in the rough map now sent to you, as I wish to ensure my claim to priority of discovery, which might fail were I to delay notice until the map I have in hand is completed. You will doubtless accept the charge of the papers with the intentions which prompt me to consign them to you. I am busy with a memoir to accompany the work at a future date; unavoidable occupations, however, prevent steady application to it, but I still hope to have it ready in a couple of months.

J. G. TAYLOR.

PROCEEDINGS
OF
THE ROYAL GEOGRAPHICAL SOCIETY.

[ISSUED JUNE 14TH, 1867.]

SESSION 1866-67

Seventh Meeting, 25th February, 1867.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT,
in the Chair.

PRESENTATIONS.—*The Rev. Pierce Butler; Alexander F. Low, Esq.; Henri L. Bischoffsheim, Esq.*

ELECTIONS.—*Henri Louis Bischoffsheim, Esq.; Dr. D. Brandis, F.L.S.; T. W. Forsyth, Esq., C.B. (Bengal Civil Service); Jones Lamprey, Esq., M.D. (67th Regt.); Rev. Samuel Martin Mayhew; Colonel the Right Hon. Lord Seaton; Edward Thornton, Esq., C.B.*

ACCESSIONS TO THE LIBRARY SINCE THE LAST MEETING. *Donations.*—*'North American Rock-writing and other Aboriginal Modes of Recording and Transmitting Thought.'* By Thomas Ewbank. Donor, A. Petrie, Esq. F.R.G.S. *'Reisen durch Süd Amerika.'* Donor and Author, J. J. von Tschudi. *'Vallesiae et Alpium Descriptio.'* By Josiae Limleri. Donor, S. M. Drach, Esq., F.R.G.S. *'Guide to Australia.'* 1863. Donor and Author, S. W. Silver, Esq., F.R.G.S. *'Night Records of a Journey to Jesso, by a Japanese Traveller in 1861.'* 3 vols. *'History of Chinese Geography.'* 32 vols. *'The Yellow River.'* 7 vols. *'Chinese Dictionaries,' &c.* 5 vols. *'Japanese Illustrations of the People of Jesso,' &c.* Photographs of Chinese Scenery, People, &c. Map of China. Road Maps, &c. All by Dr. J. Lamprey, 67th Regt. 17 Vols. and Pamphlets from Christiania, of Reports of Learned Societies, Statistics, &c. Collection of Original Drawings of a Journey in Australia. By Dr. F. Mueller. Presented by Sir R. Murchison. Elementary Treatise on 'Quartz and Opal,' including their Varieties. Donor and Author, George William

Traille, F.G.S.E. Report on the Irrigation of Eastern Spain. Donor and Author, Clements R. Markham, F.S.A.

ACCESSIONS TO MAP-ROOM SINCE THE LAST MEETING. — One sheet of Topographical Survey of Sweden: Nyköpings Lan. Presented by Major-General J. A. Hazelius, Chief of the Royal Topographical Corps of Sweden. Natal: a Map of the Zulu and Adjacent Country. Presented by Capt. Walmsley, F.R.G.S. Map of the Republic of Paraguay and Provinces of Corrientes and Entre Rios. Presented by T. I. Hutchinson, F.R.G.S., British Consul at Rosario. 3 sheets of the Geological Map of Sweden. Presented by Professor A. Erdmann, Chief of Geological Survey of Sweden. France: Carte Hydrologique du Département de la Seine. Presented by M. Delesse, Professor of Geology and Engineer to School of Mines, Paris. Switzerland: 9 sheets of Dufour's Atlas, corrected up to 1866. Presented by the Federal Government.

The following Papers were read:—

1. *An Exploration of the River Aquiry, an Affluent of the Purus.* By W. CHANDLESS, Esq., M.A., Gold Medallist of the Royal Geographical Society.

THE Author began by recapitulating the chief points of interest in his narrative of the Exploration of the Purus in 1864-5, which was read last Session before the Society, whilst he was on his second journey (in 1865-6) up the river to examine its chief affluent the Aquiry. For the first fifty miles the Purus is a fine broad river, in parts broad and straight enough to give a fair water-horizon. Above this begin the numerous abrupt windings that add so much to its length. This unexpected tortuousness has thrown wrong most calculations about the Purus made from information obtained on the Amazons; thus Count de Castelnau estimates that the mouth of a certain affluent of the river must be at least as far south as 12° , that is more than 8 deg. of latitude from the Amazons; but it is really in latitude $7^{\circ} 48'$, or only 4 deg. south of the main river. There are very few settlers on the Purus; the one furthest from its mouth—about 250 miles—being an intelligent enterprising man who has begun to make a plantation of india-rubber trees, but he complained that the macaws bite off and drop down the unripe seeds of all the trees in the neighbourhood, so that it was difficult to get good seeds. The Indian tribes of the river are, in ascending, first, the Muras, who thinly people its banks for 250 or 300 miles; second, the Puru-purus, or Pammarys, essentially a water-side tribe, unwarlike and good-humoured; third, the Hypurinás, a grave

warrior-tribe, but whose wars are but village wars among themselves—they extend along the river for nearly 300 miles (not counting the local bends), the lower half have to some extent dealings with white men, but the rest are wild. After the Hypurinás there is a break of 100 miles or more where Indians are rarely seen, and beyond that a tribe is met with far more civilised than any below—the Manentenerys; they plant cotton, spin and weave it; when first met with they showed no fear, like other Indians, but met the traveller half-way; they seemed to have had some communication overland with the Catholic missionaries at Sarayacu on the Ucayali: they are fairly supplied with iron implements, which they seem to obtain from the Peruvians of the Ucayali, not directly, but through the medium of other Indians. Mr. Chandless heard of a portage here from the Purus to the Ucayali, over which a canoe could be dragged in two days, and, when embarked on the Ucayali, arrive at Sarayacu in ten days; but he was unable to verify the fact. The Manentenerys were industrious and well-clad, and their women seemed to be well-clad. Beyond the Manentenerys came the Canamarys, which had never before been reached by travellers from the Amazons. They were honest and well-mannered, and live on good terms with their neighbours. Beyond the villages of this tribe there was again a long gap destitute of inhabitants, and Mr. Chandless then met with Indians, near the sources of the main river, who had never had any intercourse, even indirectly, with civilised men; they were ignorant of the use of iron, using stone implements, specimens of which he exhibited to the meeting.

The Purus for nearly its whole length flows through an alluvial plain with occasional clay cliffs, similar to those observed throughout the line of the main Amazons. The Aquiry flows through what is called in Portuguese *terra firme*, but the country, like that of the Purus and Upper Amazons, is densely covered with forest. On the Aquiry Mr. Chandless picked up some fossil bones which, on being shown to Professor Agassiz, were pronounced by him to belong to the Mososaurus. The animals seen on the banks of the Aquiry were very tame. Capybaras were especially numerous, resembling flocks of sheep on the banks. On the sand-banks of the Purus the green ibis and the peacock-heron used to run along a few yards ahead of the canoe. In one place, Mr. Chandless witnessed the unusual sight of numerous flocks of curassow-birds settled on the ground, attracted by fruit growing near the edge of the water. The lower part of the Aquiry was inhabited by Hypurinás; higher up succeeded the Capechenes tribe, who have no canoes, but merely a few rafts of arrow-grass. The first 300 miles of the Aquiry Mr. Chandless found no difficulty

in navigating, even at the lowest stage of water. He considered it to be perfectly navigable for steamers up to the parallel of 11° s. At some future time it may become a valuable means of communication with the province of Carabaya in Southern Peru—the more so as thus far it comes straight as if from the Madre de Dios; still it was not of a size to give him much hope of its being that unapproachable river. After the parallel of 11° the Aquiry bends from the west and becomes wider and shallower, so that the party had to drag the canoes perpetually over the obstacles. At last canoe-travelling was completely stopped by a network of stranded timber, and Mr. Chandless had to leave behind most of his party with the larger canoe, and continue the journey in a small boat (*montaria*). He was here a little too early, for the dry season had not yet broken up and given depth to the upper course of the river. At length he found it useless longer to continue the laborious task, and turned to descend.

From a point a little above where the Aquiry bends from its easterly to a northerly course, lat. 11° s., Mr. Chandless started inland on foot, striking due south and hoping to reach some other river belonging to the Madre de Dios basin. For the first three or four miles inland the wood was tolerably clear, but beyond that distance almost impenetrable, except where the party cut a path. At the end of a week he was compelled to return for want of provisions. At four or five miles from the bank of the Aquiry he crossed a low ridge, and beyond this came to a succession of small streams, all with a general direction of east. Mr. Chandless concluded by expressing his opinion that the Madre de Dios falls into the Beni, perhaps between 11° and $11^{\circ} 30'$ s. lat.

The paper will be published entire, with the Author's map of the Aquiry, in the Journal, vol. xxxvi.

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2. *Journal of an Expedition to Explore the Courses of the Rivers San Gavan and Ayapata, in the Peruvian province of Carabaya.* By DON ANTONIO RAIMONDY, Honorary Corresponding Member of the Royal Geographical Society.

DON ANTONIO RAIMONDY, our Peruvian Honorary Corresponding Member, who is already well known to South American geographers as the author of a valuable work on the Amazonian province of Loreto, has now communicated to the Society a most interesting paper, containing the results of his exploration of the rivers San Gavan and Ayapata, in the Peruvian province of

Caravaya. The maps of this region are so incorrect as to be quite useless, and it was the desire to fix the positions of these two rivers, from their sources in the Cordillera to their junction with the Ynambari, which led Señor Raimondy to undertake this adventurous journey in August, 1864.

The province of Caravaya is traversed from W.N.W. to E.S.E. by the great cordillera of the Eastern Andes, and a narrow strip of territory along its eastern frontier is occupied by the snowy peaks and ridges, and by a very lofty table-land to the southward. The rest of the province is to the eastward of the Andes, and consists of a series of mountain-ridges, with rivers between them, which branch off from the main chain, and gradually sink down into the vast Amazonian plain. They are covered with forests, the home of the inestimable chinchona-trees, and present some of the most magnificent scenery in the world. It had always been believed in Peru that the rivers of Caravaya, and those further to the north-west which drain the Cuzco Andes, formed the sources of the Purus. The great discovery of Mr. Chandless, who found the sources of the Purus and of the Aquiry in the forests, at a distance from the mountains, has proved that this was an error, although a glance at the map will show that it was a very natural one. Señor Raimondy now tells us that it has been discovered that these Cuzceñan and Caravayan rivers are actually tributaries of the Beni, one of the three main affluents of the Mamoré. Don Faustino Maldonado, a native of Tarapoto, whose exploration of the Ucayali was brought to the notice of the Geographical Section of the British Association at Leeds in 1858, lost his life in making this discovery. On the 5th of February, 1861, he constructed a canoe, and, with seven companions, embarked on the river Tono, near its confluence with the Piña-piña. These rivers flow through the forests of Paucar-tambo, to the eastward of Cuzco, and form the Madre de Dios or Amarumayu River, which, after uniting with the Ynambari from Caravaya, has hitherto been supposed to form the main source of the Purus. Maldonado continued to descend this great river, passing many mouths of affluents, generally entering on the right bank, until he reached a rapid which obliged him to land, and repair his canoe. Soon afterwards he entered the river Mamoré, and found himself among the savage Caripuna Indians. On the 18th the canoe was capsized in a rapid called *Calderao do inferno*, and Maldonado was drowned, with three of his companions. The other four continued the descent of the Mamoré and Madeira, passing the town of Borba, and entering the river Amazons. They obtained a certificate from the Brazilian authorities at Barra, and returned to Tarapoto, their native place

on the Huallaga. In the beginning of 1862 these four companions of the unfortunate Maldonado ascended the river Ucayali to Cuzco, and showed the authorities there the certificates of their perilous voyage. Maldonado was unacquainted with the names of the rivers which he navigated in his frail canoe, but as the Beni is the only large river which flows into the Madeira in that part of its course where the Caripuna Indians are met with, as we are informed by Lieut. Gibbon, U.S.N., Señor Raimondy is of opinion that the united Ynambari and Madre de Dios flow into the Beni, and that Maldonado entered the Madeira by descending its tributary the Beni. He is confirmed in this opinion by the circumstance that the account given of the mouth of the Beni by Maldonado's companions, agrees with the report of Señor Palacios, who explored a portion of the Beni many years ago, by order of the Bolivian Government. These interesting particulars are supplementary to the discoveries of Mr. Chandless, and finally settle the long doubtful geographical question respecting the numerous rivers which drain the Andes of Cuzco and Caravaya. They are sources, not of the Purus, but of the Beni.

Señor Raimondy's own valuable labours were confined, on this occasion, to a careful examination of the courses of the two most western Caravayan rivers, the San Gavan and Ayapata, from the Andes to their mouths in the Ynambari, and also of that portion of the Ynambari itself between the mouths of these two tributaries.

The villages of Caravaya are situated near the commencement of the forest region, in the deep ravines formed by the rivers, at an elevation from 6000 to 8000 feet above the sea. Those visited by Señor Raimondy, on this occasion, were Ituata, Ayapata, and Ollachea. He describes the climate as agreeable, but as occasionally foggy. In the mornings the loftier regions are free from mists, while the warm forests below are covered with a dense cloak of fog, which, when looked at from above, appears like a sea of fleecy vapour. The upper regions then receive the first rays of the sun, and, becoming warm, a current of air rushes up from the forests below, bringing with it dense masses of vapour. After visiting the sources of all the streams which form the rivers Ayapata and San Gavan, he commenced an adventurous journey down the valleys of Ollachea and San Gavan, in order to examine the whole course of the river, as far as its confluence with the Ynambari. The river San Gavan flows through a ravine so narrow that, in many places, there is no room for a path between the cliffs and the water. At last the gorge became impassable, and it was necessary to return to Ayapata, and reach the San Gavan River, by another route,

across the forest-covered mountains. Señor Raimondy describes the scenery at the point where the forests commence, as grand and majestic in the extreme. The eye extends over a vast panorama of verdure, bounded only by the horizon, with the silvery sheen of reaches of the rivers showing here and there through the foliage. Unfortunately the dense masses of cloud only occasionally open, so as to disclose this sublime prospect. Generally the view consists of a rolling mass of fleecy clouds, with a few forest-covered hills, rising up, like islands, in the midst.

Descending into these cloud-covered forests, Señor Raimondy reached the estate of San José de Bellavista, on the banks of the San Gavan, the extreme limit of civilization. Here a most enterprising Peruvian, named Aragon, cultivates sugar-cane for making rum, cocoa, coffee, pine-apples, and maize for the support of his labourers. This estate is 2400 feet above the level of the sea. It is well within the haunts of the savage Indian tribe of Chunchos, and has frequently been attacked by them, especially in 1851 and 1862.

Raimondy left San José on the 7th of September, and entered the unexplored forests with a few Indians and 15 days' provisions. They had to force their way through the tangled vegetation, and, in some places, where perpendicular precipices rose sheer up from the river, it was necessary to make a sort of Jacob's ladder of *lianas*, and so ascend the wall of living rock, descending again where it receded so as to leave walking space between the cliffs and the river. It took a whole day to advance a league in such a country.

At length they reached the banks of the great river Ynambari, at a point where it is more than 200 yards in width. At the confluence of the San Gavan and Ynambari the elevation above the sea is 1570 feet. Señor Raimondy is of opinion that, at a very short distance below this point, the Ynambari would be found to be navigable, because the hills here become very low, and soon afterwards sink altogether into the vast Amazonian plain. Between this point and the confluence of the Madre de Dios the slope is less than 8 feet per league.

Señor Raimondy then followed the course of the Ynambari up-stream, until he reached the point of its confluence with the Ayapata, a distance of about 12 geographical miles. He returned by following the course of the Ayapata up-stream, encountering great difficulties, hacking his way step by step through dense forests, wading across rapid streams, crossing the river on trees cut down and thrown over it for the purpose, and scaling most formidable precipices. The provisions ran short, and hunger added to the fatigue of this return journey.

The results of his expedition were—the exact delineation of the courses of two important affluents of the Ynambari, and of a portion of the course of that river itself; the more correct fixing of the positions of the villages of Ollachea, Ayapata, Ituata, Corani, and Macusani; and the discovery that the San Gavan and Ayapata flow directly into the Ynambari, without uniting either with each other or with the river Marcapata, as they are erroneously made to do on most modern maps. Señor Raimondy made careful meteorological observations at each encampment, and his paper is enriched with numerous valuable notes on the trees he met with during the course of his expedition; which give some new information respecting the geographical distribution of plants, as regards elevation above the sea, in a very important botanical region.

There is reason to hope that, before long, we shall receive further communication from Señor Raimondy, as it is his intention to continue his explorations in the valleys of Caravaya.

Señor Raimondy's Paper will be printed entire in Journal, vol. xxxvii.

The PRESIDENT, in returning thanks to Mr. Chandless, reminded the meeting that this was the first appearance before the Society of this successful traveller, since receiving the Royal Medal last session for one of the most remarkable geographical explorations ever undertaken by one individual. Mr. Chandless had qualified himself for his recent researches by long explorations in various parts of America. He began by traversing North America, publishing an interesting book on the journey, entitled 'A Visit to the Salt Lake;' and he afterwards travelled through South America, from the Paraguay to the Amazons, down the Tapajos River. Mr. Chandless then devoted about two years to the exploration which gained for him the highest distinction of this Society, namely, that of the river Purus, a tributary of the Amazons, which he ascended for more than 1800 miles. He at the same time laid down the various windings of the river by accurate observations. Mr. Chandless had performed this labour entirely at his own expense. He (the President) believed that it was no exaggeration to say that the Society had never previously had before it any one who, at his own instance, had accomplished so much as Mr. Chandless.

Mr. MARKHAM said that it must have struck all those who had read works on the subject of the valley of the Amazons, how very fortunate that region had been in its scientific explorers. In the last century there was the great name of La Condamine, and we had had in this century many men of scientific reputation who had visited and written about different portions of the Amazons Valley—Humboldt, Spix, and Martius, Poeppig, Castelnau, and Smyth, and, in later years, Bates, Spruce, and Wallace. That region had been most fortunate in its latest explorer, Mr. Chandless. The Society had seldom received a more admirable piece of geographical work than the minute and complete maps of the Purus and Aquiri rivers which Mr. Chandless has presented. Judging from the descriptions of the mouth of the Purus given by La Condamine and Smyth, that river appeared to be one of the most important secondary rivers in South America, but it had been scientifically unknown until 1864. Now, however, thanks to Mr. Chandless, it has been accurately mapped very nearly to its source, although Mr. Chandless modestly

omitted to state that he had reached the source. At all events, he reached a spot where his canoe grounded. His work is of great geographical value from the numerous astronomical observations made throughout the course of the river. The belief of the Peruvians, resting not on fact, but on opinion—a belief which he (Mr. Markham) had fully shared—was, that the drainage of the glorious eastern slopes of the Cordilleras of Carabaya and of Cuzco formed the sources of the Purus. That belief was now dispelled. It was at length known that neither the Purus nor any of its tributaries came near the Andes, and that their sources were in the virgin forests of the vast Amazonian plain. For this knowledge, and also for the great advantage of having the Purus thoroughly mapped, the acknowledgments of the Society were due to their gold medallist Mr. Chandless. The second Paper, which had been read, communicated the fact that the ill-fated Peruvian explorer, Faustino Maldonado, had ascertained that the rivers flowing from the Carabayan Cordilleras were tributaries of the Madeira, one of the secondary rivers of the great Amazons system. The people of Cuzco had a universal belief that the river which flowed through the forest eastward of Cuzco, called the Tono, was the headwater of the Purus; and when he (Mr. Markham) was at that ancient Inca city, 13 years ago, a noble old Italian missionary, Father Bovo de Revello, had recently published a pamphlet, entitled ‘*El brillante porvenir del Cuzco*’ (the brilliant future of Cuzco), in which he prophesied that hereafter, by the navigation of the Purus, the grand old city would be brought several thousand miles nearer Europe than its modern rival Lima. It was even now possible that the dream might be realised; but the road must be sought by the Madeira and the Beni, or possibly by the Aquiri, and not by the Purus. The discovery of Maldonado with respect to the rivers flowing from the forests eastward of Cuzco being affluents of the Beni, were very curiously corroborated, to a certain extent, by the historical narratives of the old Spanish conqueror Cieza de Leon, and of the Inca Garcilasso de la Vega. One of the great sovereigns of the great empire of Peru, Inca Rocca, invaded the forests to the eastward of Cuzco, and discovered that all the rivers united and formed one stream, which was called the *Amarumayu* (the Serpentine), now better known as the *Madre de Dios*. Afterwards another Inca, named *Yupanqui*, made a road from the Andes to the banks of the *Madre de Dios*, and having spent three years in building canoes, in which to embark his army upon it, he descended it, and eventually reached the country of the *Moxos*, whom he conquered. If the *Madre de Dios* flowed into the Beni, the Inca would have reached the country of *Moxos*, which is in Bolivia. If it flowed in any other direction he certainly would not have reached that district. He (Mr. Markham) understood that Don Antonio Raimondy intended to continue his researches in this most interesting and important region; and he did not think that the Society could do better service than by giving every encouragement to such men, and by giving all publicity to their work. He trusted that Mr. Chandless would also continue his researches, and explore the Beni in the same admirable way in which he had done the Purus.

Mr. BOLLAERT said that his friend Professor Raimondy had written him lately that he intended to return to the region of these rivers. His explorations had been most interesting. The difficulties he had to encounter must have been very great, but his results were most accurate and valuable. His Paper and map were valuable contributions to the geography of the country.

Mr. BATES, who was called forward by the audience, said that he addressed the Society on the occasion of the reading of Mr. Chandless's paper last year on his first journey up the Purus, and he was afraid what he might say now would be little but repetition. He had himself spent nearly five years in the

great plain of the Upper Amazons, through which the Purus ran, but he was not on the Purus itself. His head-quarters were at a little town called Ega, some 200 miles west of the mouth of the Purus, and situated on the banks of a lake, or expansion of the bed of a tributary, 5 miles broad and of unknown length. He thence made excursions in various directions; on one occasion for several months, a distance of 400 miles westward of his head-quarters. The whole region formed a nearly level plain, the only inequalities being rounded elevations of a clayey formation not more than 60 or 70 feet above the level of the river. It had been ascertained that this vast plain of the Upper Amazons extended at least 500 or 600 miles from north to south, and about 800 miles from east to west. It was entirely covered with forest, the trees matted and locked together by woody lianas, or climbing plants of infinite variety, and rising to an average height of from 120 to 150 feet. There was scarcely an acre of open or grass-land. The soil was most fertile. It was composed of alluvium—the deposits and washings of the river sediment accumulated during countless ages. In some parts, where the banks of the river were washed by currents, he had seen a depth of more than 20 feet of vegetable humus. This level country was traversed east and west by the main Amazons, a stream without a rock to interfere with its free navigation, up which steamers of considerable draught might proceed at all seasons of the year for 600 miles beyond the farthest point he had reached—a distance therefore of 2400 miles from the Atlantic. The river was already navigated monthly, by a line of steamers, to this distance. This great and fertile country, with all these advantages of easy communication, was, however, almost unpeopled. The population of the whole plain within Brazilian territory, the last time a rough census was taken by the Brazilian Government, amounted only to 40,000. On an average, the villages are about 100 miles apart, and each village contained not more than 600 or 700 inhabitants, the greater part of whom were pure-blood Indians, the rest being half-breeds and a few white families from the southern provinces of Brazil sent out to administer justice or attend to similar duties. This region would doubtless be a grand country in the distant future, and the banks of the main river Amazons would be the first to become peopled and flourishing, as the main stream alone offered an uninterrupted communication between the Atlantic and the fertile provinces of East Peru. The inhabitants of Southern Peru, beyond the reach of the main Amazons, had always looked to the Purus, one of its principal southern tributaries, as their future great highway to the Atlantic. The great interest attached to its exploration can therefore be readily understood. These hopes were damped by the results of Mr. Chandless' investigation, at least for the present, for the river was found to terminate in the midst of almost uninhabited forests. As, however, the great navigable streams of Southern Peru have been discovered to find their way into the Atlantic instead of into the Purus, some might ask why the Madeira should not become this great channel of navigation? The reason was simply that this fine stream before joining the Amazons passed through a range of hills, the western frontier of the highlands of Brazil, and the navigation was interrupted by a succession of waterfalls. Small canoes could ascend only at high water and by much labour. All the other southern tributaries of the Amazons to the westward were far too short to reach Peru, and the Ucayáli, the largest of the westerly affluents, did not reach so far south as the rich province of Carabaya.

Mr. WALLACE, in answer to an invitation by the President, said he had not himself visited the interesting district described in Mr. Chandless' paper. There appeared, however, to be a very singular geographical fact brought out by the discoveries of Mr. Chandless, namely, a very great similarity or parallelism between the tributary rivers on the south of the Amazons and those on the north—particularly between the Purus and the river Uaupés, an

affluent of the Rio Negro, which he (Mr. Wallace) ascended. It was a very curious circumstance that an immense district of country immediately at the foot of the Andes, both north and south, should, apparently, not receive a single drop of water from those mountains. On the south of the Amazons there was an enormous triangular district, as large as France, between the Madeira and the Ucayali, and immediately below the great range of the Andes, and yet its rivers were not derived from that range. Exactly in the same manner, on the north of the Amazons, the Japura and the rivers east of it appeared to terminate in the great forest-plains before they reached the Andes. He had ascended the Uaupés far enough to ascertain the same fact with regard to this stream. Though prevented from reaching its source, he ascended to a point near a cataract, where the river, though very wide, was a slow, sluggish, black-water stream, and he heard that for 10 days' journey farther up it continued so all the year round. This was a sufficient proof that not a drop of water came from the slopes of the Andes. Hence, there were enormous plains north and south of the Amazons which were, by some means, cut off from the drainage of the Andes. It would be very interesting to ascertain what was the cause of this separation. It would appear probable that it must depend in some manner upon the peculiar contour of the country. There might be a local elevation or ridge near the foot of the range, but separated from it, which caused the water to flow north and south and find an outlet in one of the great rivers. He observed in the map figures indicating the altitude of the river Purus at different points. He wished to ask Mr. Chandless whether those figures could be relied on?

Mr. CHANDLESS, in reply, said that he believed, quoting from memory from Mr. Wallace's book, it was found that the barometer stood higher at the town of Barra than at Pará, and he had found that at 600 miles up the Purus it stood higher than at Barra. That, of course, gave a false result as to elevation, but he believed that the observations were quite correct instrumentally. His barometer had been tested at Kew. Some allowance must be made for receding from the equator and the diminution of the equatorial depression of the barometer. He could not believe that at a point 1500 miles from the sea the elevation would be only 107 feet.

In answer to a question from Mr. MARKHAM, Mr. Chandless said that the greatest height he had observed on the Amazons was 1010 feet; and on the Purus about 1088 feet. This would accord with the general level of the country as ascertained by Señor Raimondy's observations; one-tenth of an inch variation of pressure on the barometer would be equal to 100 feet.

The PRESIDENT inquired the altitude of the ridges above the stream towards the headwaters of the Aquiry.

Mr. CHANDLESS replied that the highest ridge was about 250 feet above the river. He did not see any land high enough to be called a chain of hills.

Mr. MARKHAM asked whether Mr. Chandless saw any high land on the horizon in the direction of the Andes.

Mr. CHANDLESS said that one of his men whom he sent up a tree reported that he could see blue hills about s.s.w. That would agree with the position of the hills on Mr. Markham's map.

Mr. WALLACE asked whether Mr. Chandless had any simultaneous observations made at Barra while he was on the Purus.

Mr. CHANDLESS replied that he had not. He had given, besides the means of his barometrical observations, the assumed means at the sea-level, but could not say whether these were correct.

Dr. MANN said that the natural range of the barometer and the difference of pressure throughout the district of the Amazons could not be less than one inch, which was equivalent to a thousand feet. Although Mr. Chandless's

barometric observations were valuable in themselves, still they could not be relied on as indicative of height unless simultaneous observations were made elsewhere by a standard instrument, by which errors due to the variation of atmospheric pressure could be eliminated.

Mr. CRAWFORD said that it struck him that the tribes of Indians in the valley of the Amazons were much like herds of the lower animals. He believed that the reason of the paucity of population in that immense plain was the enormous quantity of timber which grew there. A country covered with forests was always deficient in useful plants capable of cultivation and in animals amenable to domestication. The fertile valley which had been spoken of might be very valuable some day, but the Spaniards and Portuguese had been in occupation of it for upwards of 300 years and made nothing of it. He wished to be informed by Mr. Chandless whether the different tribes of natives whom he met spoke the same language, or whether their languages were different and founded on the American principle of agglutination. He wished also to know what animals were met with on the Purus.

Mr. CHANDLESS replied that he had met eight tribes, speaking, he believed, as many different languages. As to the animals, he had seen the curassow-bird, the tapir, and the capivaras (or water-hog), the last of these being very common. Monkeys were to be found in the trees by the river-side, but he had met with scarcely any animals on his land journey through the forest, the noise of cutting the path through the timber having probably frightened them away.

To an inquiry from Dr. WEBSTER as to whether india-rubber-trees were numerous in the forest, Mr. Chandless replied that they were numerous far up the Purus. Those who were accustomed to prepare india-rubber said that it was of good quality.

Eighth Meeting, 11th March, 1867.

MAJOR-GENERAL SIR HENRY C. RAWLINSON, K.C.B., M.P., VICE-PRESIDENT, in the Chair.

PRESENTATIONS.—*Pearson Morrison, Esq.; Richard Baxter, Esq.; Edward Thornton, Esq., C.B.; Frederick Berridge, Esq.*

ELECTIONS.—*H. L. Anderson, Esq.* (late Chief Secretary to the Bombay Government); *C. F. Collier, Esq.; Colonel Richard Crewe; William Leighton Jordan, Esq.; William Martin, Esq.; Pearson Morrison, Esq.; James O'Brien, Esq.; Francis Beaufort William Quin, Esq.; William Rossiter, Esq.; Colonel J. C. Salkeld* (H.M.'s Indian Forces); *Charles William Shepherd, Esq., M.A., F.Z.S.; Edwin Story, Esq., M.A., St. John's College, Cambridge.*

ACCESSIONS TO THE LIBRARY SINCE THE LAST MEETING.—'Elementary Treatise on Quartz and Opal,' by George Trail, F.R.G.S. Presented by the Author. 'Polynesia: a Popular Description of the Physical Features, Inhabitants, Natural History, and Productions of the Islands of the Pacific; with an Account of their Discovery and

the Progress of Civilization and Christianity amongst them,' by G. F. Angas, F.L.S. Also, 'Australia: a Popular Account of its Physical Features,' &c. Presented by the Society for Promoting Christian Knowledge. 'Viaggio di Cinque Anni in Asia, Africa et Europe del Turco, di Gio Battista de Burgo, 1687.' Presented by S. M. Drach, Esq., F.R.G.S. 'Greenland—Eskimo Vocabulary for the use of Arctic Expeditions, 1853.' 'Eskimaux and English Vocabulary, for the use of Arctic Expeditions, 1850.' Presented by Capt. G. H. Richards, R.N., Hydrographer to the Admiralty. 'Beiträge zur Geologischen in Kaukasischen Ländern, von H. Abich.' With a map. Tiflis, 1865. Presented by the Author, H. Abich. 'Kertsch und Taman-Karten der Halbinseln Kertsch und Taman;' 'Aperçu Voyages en Transcaucasie en 1864;' 'La Geologie du Daghestan, 1862,' donations from the Academ. Scien. de St. Petersburg. 'An Elementary Physical Atlas, intended chiefly for Map-drawing and for the study of the great physical features and relief contours of the Continents; with an Introduction to serve as a guide for both purposes,' by the Rev. J. P. Faunthorpe, B.A., F.R.G.S. 'La Politique du Bresil, ou la Fermeture des Fleuves sous pretexte de l'ouverture de l'Amazone.' Avec une carte colorie. 'Recherches Hydrographiques de la Mer Caspienne, refermant la partie Astronomique de ces investigations.' St. Petersburg. From Vice-Admiral Tilenoy. 'Funf Jaren in Japan,' from 1863 to 1867. By J. W. J. L. C. Pompe van Meerdervoort. Purchased. 'Ueber Colonization in Ost Africa,' von Otto Kersten. Wien, 1867. Purchased.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING.—A Chinese Map of China, on 64 sheets. A Chinese Map of the Province of Shan-si; showing part of the Great Wall, and of the Hoang-ho or Yellow River. Presented by Dr. J. Lamprey.

The CHAIRMAN informed the Meeting that the President was unavoidably absent through indisposition; but he had forwarded to him, to be read that evening, a statement relative to the reported death of Dr. Livingstone. He (the Chairman) would first read the letter of Dr. Kirk to Mr. Bates, the Assistant-Secretary, which had been published in the 'Times,' and afterwards the communication of the President.

"MY DEAR BATES,

"Zanzibar, Dec. 26, 1866.

"I have written fully to Sir Roderick three weeks ago, *viâ* the Cape of Good Hope and St. Helena, again *viâ* Mauritius and Suez, with all information we yet have got regarding poor Livingstone.

"As I am going to Kilwa and Mikindany for a few days, to see if anything is there known of the sad story,—and to seek for any letters which may have been sent by Dr. Livingstone, before crossing Lake Nyassa,—I write a note to you, that may go by any ship passing here while I am absent. On the 5th of

December, nine Johanna men of the party which accompanied Dr. Livingstone came to Zanzibar, reporting that on the west of Nyassa, some time between the end of July and September, they were suddenly attacked by a band of Mavite, and that Dr. Livingstone with half his party were murdered. Those who returned escaped, as they say, through being behind and unseen, and they all depose to having helped to bury the dead body of their leader the same evening. Although in the details and in other things the accounts of the various men differ, they all agree that they saw the body, and that it had one wound—that of an axe—on the back of the neck. One man saw the fatal blow given.

"The attack was sudden, and Dr. Livingstone had time to overpower those who faced him, and was struggling to reload when cut down from behind. I fear the story is true, and that we shall never know more of its details. Full statements have gone home, but this may reach Aden by an American vessel during my absence.

"You will see, if this arrives first, that we have sad news for the Society on the way.

"J. KIRK."

The despatches and letters alluded to by Dr. Kirk had not yet arrived, and were not expected for a fortnight. The following were remarks on Dr. Kirk's statement communicated by Sir Roderick:—

"11th May, 1867.

"Regretting particularly that, owing to indisposition, I am unable to attend the Meeting this day, I beg the Fellows of the Society to recollect that, in announcing the reported death of my dear and valued friend Dr. Livingstone, I spoke of it as an event which required to be substantiated by better evidence than that of the nine men of Johanna in the Comoro Islands, who brought the sad intelligence.

"I am informed by travellers who know these people well, that they are Mahomedans who, if they became disgusted with or intimidated by the ferocious Pagan natives on the borders of the Lake Nyassa, might have abandoned their chief; and, having agreed upon the story they were to tell, would hold together firmly in maintaining its truth.

"There are also several parts of their narrative which seem to me to be difficult to understand. Their being hidden in a wood, and yet their observation of the attack on Livingstone being so accurately described.

"Again, if, as the Johanna men state, they buried their leader, is it likely that they would in such case not have brought away with them some relic to vouch for the truth of their story? Presuming that if hostile natives had killed Livingstone, they would have cared little for his note-books, one of them alone, or even a lock of his hair, would have been good auxiliary evidence.

"Further, when I recollect that many an African traveller who has returned safely to England has been reported to have been killed (usually by runaway natives who had deserted him), I shall not abandon all hope until Dr. Kirk, the former devoted companion of Livingstone, and who has gone towards the scene of the alleged disaster, shall have satisfied himself that the calamity really occurred, and that Philanthropists and Geographers have lost the great traveller who had already won for himself imperishable renown.

"I have only to add that the more detailed account which Dr. Kirk had sent to me, before the letter which appeared in the 'Times' was written, will, I apprehend, throw little new light upon the alleged murder, as it can be nothing more than a detailed account of the story as related by the Johanna men. The search into the truthfulness or otherwise of the account received must occupy some time.

"RODERICK I. MURCHISON."

He (the Chairman) agreed with Sir Roderick Murchison in all his observations. The story told by the men was a very lame one as it stood at present, and ought not to be accepted without verification. At the same time, it was ominous that it was now eight or nine months since the assassination was said to have taken place, and no despatch had been received contradicting it. In the mean time, all that could be done was, to have patience and await the result. He (the Chairman) was sure that they would all feel that, if Dr. Livingstone had perished, not only had science sustained an irreparable loss, but that almost every Fellow of the Royal Geographical Society had lost a personal friend.

The following Papers were read:—

1. *The Delta and Mouths of the Amu Daria, or Oxus.* By Admiral A. BOUTAKOFF.

THE paper gave an account of the exploration which the author undertook of the mouths of the Oxus in two expeditions, the first in 1848-9, and the second in 1858-9. The river first begins to bifurcate in lat. $42^{\circ} 12'$ and long. $60^{\circ} 15'$ E. of Greenwich. This is the head of the Delta, the central portion of which forms a sort of depression into which the waters of all the branches, excepting the westernmost (the Laudan), empty themselves in a series of lakes more or less overgrown with reeds. The mouth of the Laudan has a depth of $1\frac{1}{2}$ to $1\frac{1}{2}$ foot only across the bar. The eastern arm, which limits the Delta, is called the Kuvan-Djarma, or Kuk (Blue) River, and, towards the sea, the Yangy Su (New River). In 1848-9 the principal mass of the waters of the Oxus was discharged through this branch, so that at $9\frac{1}{2}$ miles from the mouth the expeditionary party drew fresh water from over the side of the vessel. In 1859, on the contrary, the Aral was quite salt close up to the mouth of the Yangy Su. The author, in September, 1859, ascended this channel, and at $22\frac{3}{4}$ miles found the navigation arrested by a rocky ridge extending right across its bed, over which the water was only from $1\frac{1}{2}$ to $2\frac{1}{2}$ feet. He was compelled, in consequence, to leave behind his principal vessel, a steamer of 40-horse power, and to continue the survey in an open steamer of 12-horse power, with a crew of 18 men. The breadth of the channel further up was from 50 to 80 fathoms, and the depth 5, 6, 7, and 8 feet. After throwing off this easterly arm, the Amu Daria flows to the N.W. and N., continually emitting small branches and one larger channel, the Karabaili, which spreads out over the depressions, out of which it afterwards runs off into the one common channel of the Ulkun Daria (Great River) the branch by which the greatest quantity of water now finds its way to the Aral. West of the Ulkun is the Taldyk mouth, which had, in 1848-9, a very rapid current, with a depth of 3 feet on the bar, but which had lessened to $1\frac{1}{2}$ and $1\frac{1}{2}$ foot in 1858. The fortified town of Kungraad,

on the left bank of the Amu Daria, numbers from 6000 to 8000 inhabitants, consisting of Uzbeks, Sarts, Kirghizes, and Karakalpaks. The author, in surveying the various mouths, was often watched by armed Khivans on the banks, but no serious resistance was offered to his operations.

The paper will be printed entire, with a map, in the 'Journal,' vol. xxxvii.

The CHAIRMAN said that he remembered the time, and it was only twenty-five years ago, when the report that a Russian steamer had entered the Oxus would have caused a sensation of alarm from one end of India to the other. He was happy to say that such was not the case now. The public both in India and England looked with perfect complacency, and even with gratification, on the advance which the Russian Government had been making in prosecuting geographical knowledge through Central Asia. It was the especial happiness of the Geographical Society that, apart from all political considerations, it could yield a hearty tribute of admiration and applause to any nation and to any individual who contributed to the extension of geographical science. The paper of Admiral Boutakoff was one of very great geographical interest. It furnished precise information on many points with regard to which we were absolutely ignorant before. No astronomical observation had been ever previously taken at the mouth of the Oxus, nor had we known anything of the delta of that river. Admiral Boutakoff, however, was already well known in Russia for his extensive and successful exploration of the other great river of Central Asia—the Syr Daria or Jaxartes, which also fell into the Aral Sea. He had, indeed, conducted a steamer for above a thousand miles up the Jaxartes; a geographical feat which would live in history.

Now there were certain points connected with the rivers Oxus and Jaxartes which he (the Chairman) proposed to bring prominently before the Meeting. They referred to a physical phenomenon which he believed was without parallel in the rest of the world, being, indeed, neither more nor less than the drying up at certain periods of history of the Sea of Aral, and its consequent disappearance from the map of Asia. The Aral, in terrestrial geography, might be compared with one of the variable stars in astronomy. As there were stars varying from the first to the fifth magnitude, so the Aral was at times a great inland sea 300 or 400 miles in length, at other times a mere reedy marsh, and even, occasionally, a hard desert land, so that travellers actually passed across it without being aware that they were travelling over the bed of a sea. Humboldt had devoted 200 pages of his famous work 'Asie Centrale' to the discussion of the geography of the Aral and the Caspian, and he had established beyond dispute that the Oxus had a variable course, sometimes falling into one sea and sometimes into the other; but he had not ventured to assert that the Aral ever disappeared altogether. Nevertheless, he (the Chairman) maintained that we had direct evidence of the fact in modern times, and he thought we had a right to assume its occurrence in ancient times.

The argument was briefly as follows: In all classical geography, from the earliest date, say from 600 years B.C. to 500 or 600 years A.D., the Sea of Aral was utterly unknown in geography. There was not one single authority—Greek, Latin, or native Persian—who mentioned it. The two great rivers, the Oxus and the Jaxartes, which, by their contributions now form that sea, were described by all authors as falling into the Caspian. It must be remembered, too, that Alexander the Great conducted an army into that part of Asia, and employed officers for the express purpose of ascer-

taining the geographical configuration of the neighbouring countries. He sent his troops on an expedition along the shore of the Caspian, while he in person crossed the Oxus, and reached the banks of the Jaxartes. Hence he must have possessed accurate information as to those localities, and yet the account which his officers brought back to Greece was that both the rivers fell into the Caspian. This statement, indeed, was adhered to throughout antiquity, and a practical proof was given of its truth in the notice of the line of commerce which supplied Europe with the products of Asia. This commercial route was described as starting from the foot of the Indian Caucasus, following the Oxus down to the Caspian, ascending the Kur or Cyrus, and descending the Phasis into the Black Sea, and thence crossing into Europe. We had thus direct evidence, as it seemed, that in the days when this route was followed and described, the Oxus must have fallen into the Caspian.

The Chairman went on to say, that as the present Sea of Aral filled an inconsiderable depression in the table-land of Central Asia, having no springs, and being entirely dependent for its supply on the two great rivers already mentioned, so it followed that if those rivers at any time were diverted from the Aral, the sea would necessarily become desiccated in a very few years, and the bed of it would revert to its original condition of a mere depression in the desert. The levels were a very important element in considering this question. That of the Aral was 117 feet above the level of the Caspian, and 33 feet above the Black Sea, the Caspian itself being 84 feet below the Black Sea; so that if a communication were formed between the Aral and the Caspian, the Aral would naturally drain off into the lower basin. To proceed, however, with the argument. If, in the times of classic antiquity, there was a unanimity of evidence that the Oxus and Jaxartes flowed into the Caspian, so, from the beginning of the Mohammedan era, say from the year 600 to about 1300, or for a period of seven hundred years, there was an equal unanimity exactly the other way. During this period the Arabs and their political successors were in possession of the country. They were a literary and scientific people, and wrote numerous works on geography. They possessed the means of ascertaining full topographical details, and they invariably represented the two rivers as falling into the Sea of Aral, or the Lake of Kharezm, as it was then usually called. The only reasonable inference then seemed to be, that between the years 500 and 600 the course of the two rivers, owing to some natural disturbance, must have changed, and that, instead of continuing to fall into the Caspian, they became diverted into the sea of Aral, themselves, in fact forming that sea. Now came the most curious part of the question. From about the year A.D. 1300 to 1500, that is, for about 200 years, Europeans possessed means of becoming acquainted with the geography of Central Asia which had never been equalled up to the present day; for there were at that time frequent missions sent from the courts of Europe to Mongolia in Central Asia, and the ambassadors so employed had for the most part numerous journals of their journeys. Colonel Yule, an associate of the most distinguished of these travellers, had recently brought a general summary of those records before the public in a most interesting work ('Cathay and the Way Thither'), of which he (the Chairman) could not speak too highly, and which he could not too strongly recommend to the notice of all lovers of geographical science. Colonel Yule's book contained records of many travels across Central Asia during the 13th and 14th centuries, and in not one of those records was the Aral mentioned, although the route of the travellers lay in most cases exactly across it. One of the authors in question, named Pegoletti, gave all the details of the commercial route at that time, which conducted from the Black Sea to China, and along which merchants conveyed the luxuries of Europe, and

returned with the tea and silk of China. There were, indeed, detailed notices of the route in question, not only in the itineraries of Pegoletti, but in the maps which were constructed from memoranda furnished by travellers between the 13th and 16th centuries. One of these was called the Catalan Map; another was a map preserved in the Palatino Library at Florence; another was the Borgia Map, and the most famous of all was the Venetian map of Saint Mauro; and in none of these was the Aral noticed. The travellers came in the first instance from the Volga to Sarachak, on the eastern shore of the Caspian; and from thence they passed to Otrar, on the Jaxartes, the route lying across the bed of the Aral, which, nevertheless, in no single instance was either mentioned in the itineraries or laid down in the maps. On these negative grounds alone he should consider it quite certain that at that time the Aral did not exist, but we had fortunately positive evidence to confirm that conclusion.

Probably some of those present had heard of a very famous man called Yar Mahomed Khan, who was chief of Herat, during the period of the Afghan war about twenty-five years ago. This person had sent to him (the Chairman) during the war, as a token of friendship, a Persian manuscript, which seemed to be of very great value on account of its rarity. It was a work written by an officer of the famous ruler of Herat, Shah Rukh Sultan, and contained, amongst other matters, a geographical account of the province of Khorassan about the year 1418. The writer seemed to have been a minister of the country, and evidently knew every village and stream in the province. He (the Chairman) had made three extracts from the manuscript, which he considered to be of the utmost importance, as they recorded a physical phenomenon, namely, the desiccation of the Aral, which he believed had never up to the present time been brought to the notice of the geographers of Europe, although, as before stated, the great Humboldt had devoted no fewer than 200 pages of his standard work to the discussion of this subject. In describing the lakes of Asia the writer came in regular order to the Aral, which was called the Lake of Kharezm, and he said, "In all the ancient books the Lake of Kharezm is described as the receptacle of the waters of the Oxus, but at the present date, which is A.H. 820 (A.D. 1417), the lake no longer exists, the Jyhún (or Oxus) having made a way for itself to the Caspian, into which it disembogues at a spot called Karlawn, as will be described hereafter in its proper place." Again, in describing the rivers of Asia, he said, "It is recorded in all the ancient books that from this point the River Jyhún (or Oxus) flows on and disembogues into the sea of Kharezm; but at the present day this sea no longer exists, the river having made for itself a new channel, which conducts its waters into the Caspian. The point of embouchure is named indifferently Karlawn and Akricheh. From Kharezm to the point where the river falls into the Caspian the greater part of the country is desert."

So much for the Oxus. With regard to the Jaxartes, this writer explained another point which was of some importance; for, although the Oxus might have been diverted into the Caspian, still, if the other river entered the Aral, it would still remain a sea. But it was stated as follows:—"The river of Khojend in the lower part of its course, passing into the desert of Kharezm, joins the Jyhún (or Oxus), and thus ultimately reaches the Caspian." From which passage he (the Chairman) understood that at that time, A.D. 1417, the Jaxartes below Otrar branched off from its present bed to the left hand along a line now marked by reeds and lagoons (see map), and joined the Oxus between Kungrad and Khiva, the two rivers from that point flowing on to the Caspian in one and the same bed. This statement was of the more importance as it came from a writer thoroughly acquainted with the country. In addition to this, there was the testimony of the great Emperor Baber, who

of course knew the geography of his own country, and who said that the Jaxartes in his time did not enter the Aral, but was lost in the desert. His (the Chairman's) belief was that it sometimes reached the Oxus, and was sometimes evaporated in the desert.

Such is the history of the Oxus and Jaxartes up to about the year 1500. From that time a second change began to take place. The rivers were then found to be going back into the Aral. It might not be generally known that Mr. Anthony Jenkinson, the agent of some English merchants, passed across Central Asia to Bokhara as early as 1550. He landed on the shore of the Caspian at Ming-kishlag, and came down the coast to a point where, as he heard, the Oxus had formerly disembogued into the sea; but he was told that the river had lately changed its course and gone back into the Sea of Aral. The ruler of the country, Abul-Ghazi Khan, who had left a most elaborate history of it, gave distinct details of this occurrence, and mentioned the very year in which the river began to return into the Aral. He related how the stream gradually dried up, and formed the sea as it at present exists. Evidence indeed could be given of the condition of the stream, almost year by year, from that time to the present; but it would be sufficient to state that every modern traveller who had passed through those regions had found the old bed of the River Oxus exactly where it was originally described. It was first brought to our notice by Mouravieff, a Russian agent, who passed from the Balkan bay to Khiva in 1819. Subsequently Arthur Conolly, who was afterwards murdered at Bokhara, attempted to cross from Astrachan to Khiva, and he also came upon the old bed; and lastly Mr. Vámbéry, whom the Fellows might remember seeing at a meeting of the Society two years ago, in his famous journey across the Turkoman desert, traced the same broad river-bed, and found that it was perfectly well known as the ancient bed of the Oxus. Hence it seemed that there was sufficient evidence to show that in early times, say from the year 500 before the Christian era to the year 600 after the Christian era, both the rivers ran into the Caspian, the Aral being non-existent; that after that, up to the year 1300, they fell into the Aral; that for the next two hundred years—namely, from 1300 to 1500—they came back into the Caspian; and that then, at a fourth stage, they gradually flowed back into the Aral, and formed the sea as we now know it.

The changes thus noticed were very important in reference to what might be the future history of these rivers and these countries. It was quite certain that, as the Jaxartes was now in the possession of Russia, so the Oxus must also naturally and necessarily be, in the course of time. Now he would read what was stated by Russian writers as the probable result of that event. The Russians almost always called these rivers by the names of the Amu Daria and the Syr Daria, instead of the Oxus and the Jaxartes; but he would, in reading the extract, use the latter names as being better known:—

“The Oxus is, for many reasons, of greater importance to Russia than even the Jaxartes. It disembogued at one period into the Caspian, and its bed to that sea still remains. Some are of opinion that the course of the river can be again directed to its ancient bed, while others consider it impossible to do so. It can, however, be positively asserted that the existing information on this point is very superficial and inaccurate, and the question will never be satisfactorily settled until a scientific expedition be sent by the Government to investigate it in all its bearings. The south-eastern shores of the Sea of Aral are well adapted for uniting the Jaxartes with the Oxus, and encourage the hope that the united mass of water of two such great streams may force their way through the old bed to the Caspian. The importance of this connexion will readily be understood, when it is remembered that a water-route in continuation of the Volga will be thus created, which will extend for

3000 versts into the interior of Asia, and that the extreme points of this uninterrupted water-way will be St. Petersburg and the northern slopes of the Hindoo Koosh."

This was a result which he (the Chairman) considered highly probable, and he believed that many present at the meeting would live to see a direct water-communication from the Baltic to the vicinity of the Indian Caucasus, which was considered the natural geographical boundary of India. They must remember that already there was a direct water-communication from the Neva, by means of canals, to Lake Ladoga, and thence to the upper course of the Volga, and down that river to the Caspian. Then, crossing the Caspian, vessels could reach the mouth of the bed of the Oxus. He looked upon that prospect without any apprehension or dismay, regarding it as the natural extension of civilization, and believing that it would be for the general advantage of mankind. Sir Roderick Murchison had often observed from that Chair that the Fellows of the Society assembled for the discussion of geographical and not political questions: but he (Sir H. Rawlinson) could not avoid saying that he did not look with any apprehension on the opening of this water-communication; and he was very glad to find that Russian officers were able to help English geographers towards a more thorough knowledge of the geography of Central Asia. They were gratified that evening by the presence of the brother of Admiral Boutakoff, the author of the paper, and he hoped he would say a few words on the subject of the expedition.

Admiral BOUTAKOFF said that it afforded him the greatest pleasure to have heard the terms in which the Chairman had spoken of his brother's efforts in furthering the science of Geography. It would certainly be one of Admiral Boutakoff's greatest rewards for the trouble he had taken in the survey that this Society felt interested in his researches.

Lord STRANGFORD advocated the uniform use of the names "Oxus" and "Jaxartes," and the other classical names for the rivers of Asia, in preference to the vernacular terms adopted by the Russians, such as "Amu Daria" and "Syr Daria." He also held up as highly worthy of imitation the combination of scientific life with practical life which had been made by Sir Henry Rawlinson while engaged in the public service in the heart of Central Asia. Such a combination was quite unique.

Admiral OMMANNEY asked whether Admiral Boutakoff communicated any information regarding the soundings of the Aral, for the absence of any depression in the middle of the Sea of Aral would bear out all that the chairman had stated.

Admiral BOUTAKOFF said he could not recollect what the soundings were, but he could state that they had been published in the charts that had been made from his brother's survey.

The CHAIRMAN said that a translation of Admiral Boutakoff's original survey of the Sea of Aral was to be found in the Transactions of the Society, and in that account the soundings were given. The sea was shallow throughout. He believed that its elevation of 117 feet above the Caspian would allow sufficient fall, in a distance of 250 or 300 miles, to drain the water into the Caspian. They may have remarked that Admiral Boutakoff seldom found more than two or three feet of water on the bars at the mouths of the delta of the Oxus. This shallowness would of course prevent the entrance of any large vessel, but by means of dredging-machines a depth of two or three feet might be increased to a fathom or a fathom and a half, very much as was done in St. George's Channel, at the mouth of the Danube.

2. *A Trip to Thibet, Kylas, Source of the Sutluj, and the Mansurwour and Rakhas Lakes.* By Captain H. U. SMITH, Indian Army.

I and my companion, Mr. A. S. Harrison, M.A., left Nynce Tal the end of June, 1865; but as the first twenty or thirty marches were through well-known ground, I will take up my diary from the 31st of July and start from Shib and Chillum, two camping-grounds well known to all traders and the turning-point for all sportsmen. Being well aware that our only chance of getting past the boundary was by deceiving the natives as to the number of days' provisions we had with us (as the Tartars are cunning enough to count up the number of yaks each sportsman has with him, so as to calculate to a nicety how long his provisions will last), for they would have immediately suspected our intention of penetrating into the interior had we taken more than a few days' supply, we had previously forwarded by another pass, and under the care of a trustworthy trader, a very large supply of provisions and ammunition, and had given directions for them to be packed like native merchandize and taken to Kylas, where we hoped to join them.

On reaching Shib our difficulties began. The guard of Tartars, who are always attached to every European who enters Thibet, informed us that we had reached the utmost limit for Europeans, and that it was their duty to prevent our proceeding further. After a long argument and plenty of brandy we were permitted to march to Iydim, some 20 odd miles to the east. Arrived at Iydim, we halted some days for shooting and to decide upon our future movements, to blind or get rid of our Tartar guard, for, though not formidable in themselves, they would have soon raised the country had they guessed our intention of visiting the lakes and their holy of holies, Kylas. The only plan that appeared feasible was to leave most of our things in their charge and the few servants we could spare, and pretend to be off for a few days' shooting on the top of the surrounding hills. Two or three of the Tartars were extremely anxious to accompany us, not only to keep us in sight but for the sake of any game we might kill; however, we persuaded them to stay behind and guard our camp and servants from the attacks of Dacoits or Tartar robbers. As not even one of our servants had a notion of our intentions, we were able to get off and put 50 miles between us and them: we marched for dear life, halting only a few hours during the night, and arrived at Kylas late the next evening. I may here mention that Kylas is a little territory held by the priests, who are quite independent of the Chinese authorities, and have the power of life and death in their own dominions. We had

previously met the high priest and exchanged visits with him at Shib, where he had gone on a trading expedition: we had taken him into our confidence and asked his advice as to the best means of evading the Tartars and paying a visit to the lake. He told us that he had no power to help us out of his own district, but that if we could manage to reach him at Kylas, he would not only protect us but furnish guides and help us to the best of his ability. When close to Kylas we despatched a messenger to inform him of our approach, and asking him to appoint a place for us to encamp in. We waited with some anxiety for his reply, for we had only his word to go upon, and, had it been merely native politeness, all our plans would have been frustrated. The answer soon came that he was delighted to hear we had got through, that a camping-ground was being prepared for us, also provisions (the latter very scarce in those parts), and we found everything ready for us on our arrival.

Kylas, or rather the village of Darchin, where the high priest dwells, is situated at the foot of the hill, and is composed of one house (the priest's) and three or four huts, built on the right bank of a beautiful little stream which comes down from the mountain. We found a good number of outsiders in tents, who, together with the small population of Darchin, turned out to greet us and watch our every movement during the time we stayed there. Very few had ever seen an European, and our tents, beds, knives and forks, and the way our dinner was cooked, afforded them the greatest delight and wonder. The next morning we paid a visit of ceremony to the high priest; who received us in great state, and presented each of us with a warm Tartar chupkan or coat. We then left and returned to our tents, and he paid us a return visit. We were rather at a loss to know what to give him in return; but luckily Mr. Harrison had an air-gun with him, which we made over with several bottles of brandy. The brandy was soon drunk, but the air-gun will remain for many years the most sacred and mysterious relic in his possession.

The two visits of ceremony being happily over, we proceeded to business and asked him for one or two of his men who knew the country and could guide us to the best shooting-grounds. He ordered two men to accompany us, and we prepared for a start; but in the midst of our preparations who should come in but our Tartar guard, who threw themselves at the feet of the high priest and implored him to send us back with them. He, however, kept his promise to us and behaved nobly, pacifying the guard and inducing them to return without us: we then made our bow and started off in great glee for the Mansurwur Lake, which we found to be about 15 miles from Darchin, and encamped at the head of the lake under a

temple called Jekep. Early the next morning, the 13th of August, I put my rod together and tried a small fly and succeeded in catching twenty-six fish, running from 1 to 2 lbs.: they were without scales and rather bony. I saw some very large fish, but not having a boat I did not succeed in hooking one. This I much regret, as I fancied I saw "marseer" or a fish almost identical. We picked up some scales that must have belonged to a 60 or 80 lb. fish. The small fish that I caught were bold and eager at a fly, and fought well when hooked. From the lake we marched about 50 miles to the east and north: the first two marches were on the high road to Lhasa. We then turned to the north and kept under a large range of hills running north and south. After shooting snow-antelope and gazelle, we turned to the left and went up a valley of the Kylas range, where I was lucky enough to shoot a black wolf, the first ever shot in that part of the world. Although this may appear irrespective of what I am writing to you about, I think it as well to mention that this animal appeared to be totally unknown in the country, so much so that when I brought it in none of the natives could inform me what it was. On enquiry I find it is known in Siberia; but in this part of the world this is the first instance in which it has been met with. I have its skin and head.

We then returned to the Mansurwur Lake, and after a few days' fishing and shooting we paid a farewell visit to the high priest at Kylas, and travelled by easy marches towards Gortok. Our principal object being to track the course of the Sutluj and see if there were any outlet from the lake northward. We carefully skirted both the Mansurwur and Rakhas lakes, and found from the nature of the ground that it was quite impossible that any effluent from either lake could reach the Sutluj, nor was there any trace of an old bed or watercourse, as mentioned in Henry Strachey's paper to the Society regarding his journey in 1846; besides which it would be against the laws of gravity for water to reach the Sutluj from the Rakhas Lake, as it would have to travel a very uphill journey. The Sutluj turns almost at right angles on meeting a small range of hills, and at the nearest point must be fully 12 miles from the Rakhas Lake.

Both Mr. Harrison and myself took the greatest pains to examine the course of the river, and traced it step by step till it entered the Kylas range, where we could step across it without wetting the sole of our shoes; besides walking over every inch of the ground from the small range of hills to the Rakhas Tal; and we are both convinced that it is quite impossible there can be any connection between the two, neither is there the slightest trace of any stream or old

watercourse connecting the Mansurwur and Rakhas lakes : in fact, the Mansurwur Lake is surrounded by a small range of hills, and though fed by many streams from the Kylas range, there is no possibility of any escape (except from evaporation) on the north side of the lake. We took the best evidence procurable, and except in one instance, where the man said he thought that water from the lake might percolate underneath the hill and thus reach the Sutluj, our own ideas were strengthened and substantiated by the opinion of every one we met; in addition to which it was so palpable, that we need hardly have asked any questions.

The CHAIRMAN said that this paper was mainly interesting, in consequence of its differing on a point of physical geography from previous discoverers, and the statements of Colonel Strachey.

Dr. THOMSON said that his knowledge of Lake Mansurwur was derived merely from the records and observations of the two Stracheys, and as he had travelled with them, and knew that they were very trustworthy observers, he did not think they were likely to be wrong. They were men quite capable of recognising a river when they saw it. The flow of a river from a lake in a dry country would vary very much at different seasons, and he did not think that a traveller merely going on a fishing excursion should pass a very decided opinion in contradiction of the observations of travellers who had preceded him. He was sure that Richard and Henry Stracheys' observations would be found quite trustworthy, when carefully studied by other observers.

Captain SMITH said that in handing the paper to the Society, he had no wish whatever to criticise Captain Strachey's observations. He (Captain Smith) and his friend went to the district spoken of more for shooting than anything else. He was not himself a scientific man, but his companion was thoroughly competent to judge. By mere accident they encamped at the spot where the course of the Sutluj turned in its descent from the Kylas. They had Strachey's map with them, and they followed the course of the river up to the hills, where it came out, and, not satisfied with that, they returned the same way, to ascertain whether it was possible that there might be any drainage running out of the Rakhas Lake to the Sutluj, and they found that it would be simply impossible for any water from that lake to reach the Sutluj, for it would have to run up-hill. He submitted his observations to the Society with all due respect, and he hoped that some other traveller would go and clear the matter up.

Dr. THOMSON repeated that he did not think it at all likely that Major Strachey would be mistaken in his observations. He was well able to judge of the physical contour of a country. It was a very difficult thing to judge of the levels of a country without having the eye exercised in this class of observations. Rivers would find their way round corners in a way which ordinary travellers might not always detect, and the authors of the paper might be mistaken as to the impossibility of the water from the Rakhas Lake reaching the Sutluj.

Ninth Meeting, 25th March, 1867.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT,
in the Chair.

ELECTIONS.—*Rev. John C. Brown, LL.D., F.L.S.* (Professor of Botany, South African College, Cape Town); *Colonel Edward Conran* (Administrator of the Gold Coast); *John Dugdale, Esq.*; *Lieut.-Colonel Francis W. Newdigate* (Coldstream Guards).

ACCESSIONS TO THE LIBRARY SINCE THE LAST MEETING.—‘*La Question du Pole Nord, par Gustave Lambert.*’ From the Author. ‘*The North-west Peninsula of Iceland, being a Journal of a Tour in Iceland in the Spring of 1862,*’ by C. W. Shepherd, M.A. From the Author. ‘*Le Jardin des Racines Grèques mises en vers François, 1719.*’ Given by S. M. Drach, Esq., F.R.G.S. ‘*Cartes des Ventes dans l’Ocean Pacifique meridionale,*’ par le Comte Chasseloup Laubat. Le Ministre de la Marine. ‘*Instructions Nautiques sur les Traversers d’Aller et de Retour de la Manche à Java,*’ par C. le Hellaco. ‘*Reissen van Australie naar Java.*’ ‘*Maandelijksche Zeilaandwijzingen van het, Kanaal naar Java.*’ ‘*Anales del Museo Publico de Buenos Aires,*’ by Herman Burmeister, M.D. Presented. ‘*Five Years in Japan, 1863-67,*’ by Van Meerdevoort. Purchased. ‘*Ueber die Polärlander,*’ by Dr. Oswald Heer. Purchased. ‘*Notes on Columbus: with photographic facsimiles of the Handwriting of Christopher Columbus.*’ New York. Presented by the Hakluyt Society. Three drawings of people and habitations of Jesso, by a Japanese artist. Presented by J. Lamprey, Esq., M.D., 67th Regt. A miniature on copper of “Kama,” a Kaffir chief. Presented by R. J. Garden, Esq., F.R.G.S. Two photographs of Formosa natives. Given by R. Swinhoe, Esq. Drawings of Australian scenery, from Dr. Ferdinand Mueller, Melbourne. Presented by Sir Roderick Murchison, Bart.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING.—Map of the Province of Canterbury, New Zealand, with 5 sectional plans, showing the passable routes over the Alpine ranges from the west to the east coast. Scale, 1 inch = $\frac{1}{2}$ mile vertical, 3 miles horizontal, by J. Haast, Esq., Government Geological Surveyor. Presented by the Author, through Sir R. Murchison. A complete set of Maps, illustrating the campaigns in Germany in the summer of 1866, showing the battle-fields in Bohemia, &c., during the war between Prussia and Austria. 17 maps on 23 sheets. Scale, 1 inch = $\frac{4}{15}$ of a mile. Presented by Colonel Beauchamp Walker, C.B. A map of part of Palestine, showing the route from Jaffa to

Jerusalem, by C. Schick. Presented by Dr. A. Petermann. A map of Greece and the Grecian Archipelago. Presented by Dr. A. Petermann. Admiralty Charts, 8 in number. Ordnance Sheets, 94 in number.

The Paper of the evening was the following :—

DESPATCHES and LETTERS relating to the last Journey and reported Death of DR. LIVINGSTONE. By DR. G. E. SEWARD, Acting-Consul, and DR. J. KIRK, Vice-Consul at Zanzibar.

1. *Despatches from DR. SEWARD, H.M. Acting Political Resident at Zanzibar, to Lord Stanley, Secretary of State for Foreign Affairs.*

(Communicated by the FOREIGN OFFICE.)

“MY LORD,

“Zanzibar, December 10, 1866.

“I send you the saddest news. Dr. Livingstone, in his despatch from Ngomano, informed your Lordship that he stood ‘on the threshold of the unexplored.’* Yet, as if that which should betide him had already thrown its shadow, he added, ‘it is best to say little of the future.’

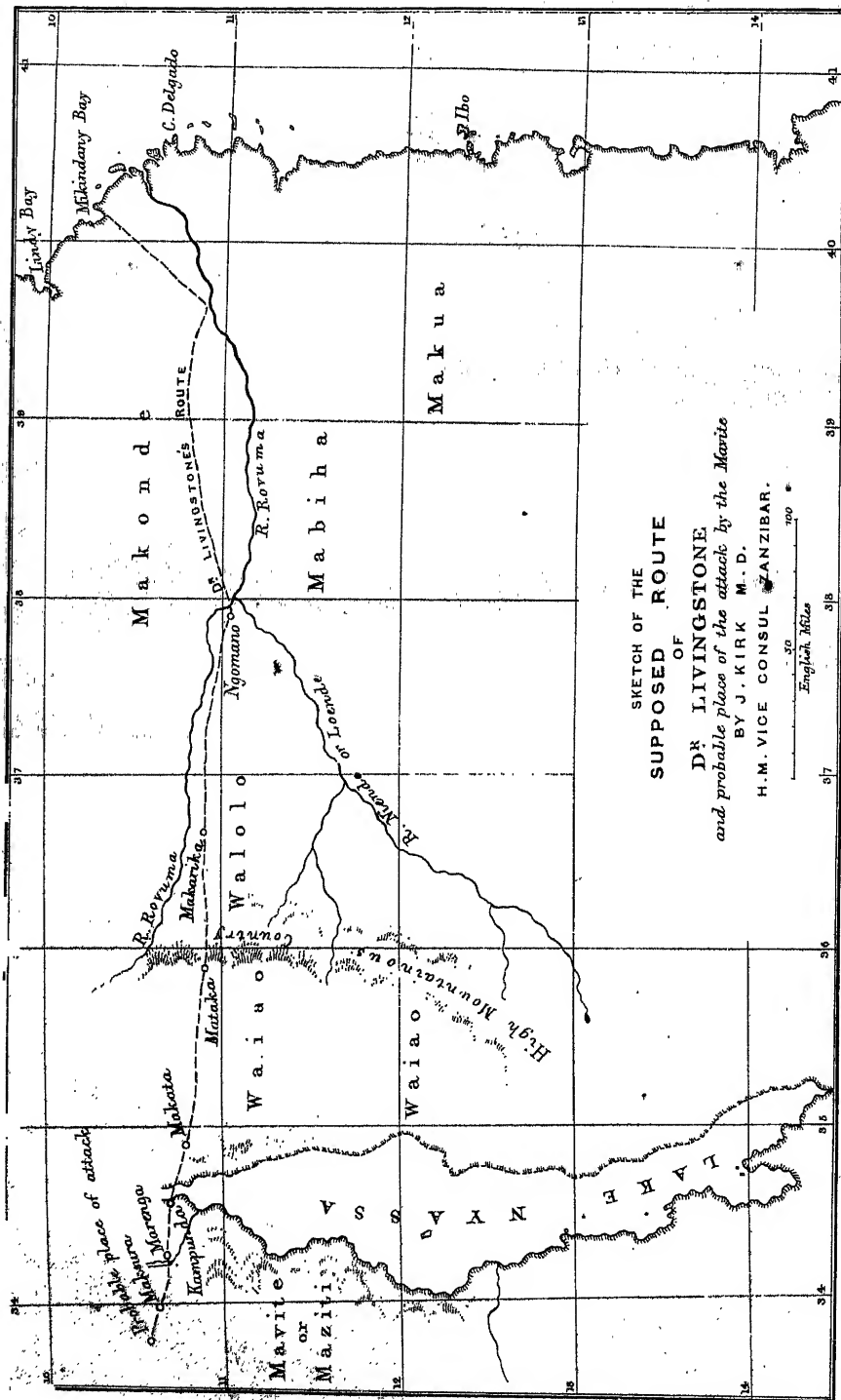
“My Lord, if the report of some fugitives from his party be true, this brave and good man has ‘crossed the threshold of the unexplored;’ he has confronted the future, and will never return.

“He was slain, so it is alleged, during a sudden and unprovoked encounter with those very Zulus of whom he says, in his despatch, that they had laid waste the country round about him, and had ‘swept away the food from above and in the ground.’ With an escort reduced to twenty by desertion, death, and dismissals, he had traversed, as I believe, that *terra incognita* between the confluence of the Loende and Rovuma rivers at Ngomano, and the eastern or north-eastern littoral of Lake Nyassa; had crossed the lake at some point, as yet unascertained; had reached a station named Kompoonda, or Mapoonda, on its western—probably its north-western—shores; and was pushing west or north-west into dangerous ground, when between Marenga and Maklisoor a band of implacable savages stopped the way, a mixed horde of Zulus, or Mafite, and Nyassa folk.

“The Nyassa folk were armed with bow and arrow, the Zulus

* “The dim outline of highlands appears even at this distance. They raise the spirits, but possibly this is caused partly by the fact that this is about 30 miles beyond our former turning-point and the threshold of the unexplored. I propose to make this, i.e., Ngomano, my head-quarters till I have felt my way round Lake Nyassa. If prospects are fair there I need not return, but trust to another quarter for fresh supplies, but it is best to say little of the future.”—See ‘Proceedings Royal Geographical Society,’ vol. xi. p. 15.





with the traditional shield, broad-bladed spears, and axes. With Livingstone there were nine or ten muskets; his Johanna men were resting with their loads far in the rear.

"The Mafite instantly came on to fight; there was no parley, no avoidance of the combat; they came on with a rush, with war-cries, and rattling on their shields their spears. As Livingstone and his party raised their pieces, their onset was for a moment checked, but only for a moment.

"Livingstone fired, and two Zulus were shot dead (his boys fired too, but their fire was harmless); he was in the act of reloading, when three Mafite leapt upon him through the smoke. There was no resistance, there could be none, and one cruel axe-cut from behind put him out of life.

"He fell, and, when he fell, his terror-stricken escort fled hunted by the Mafite. One, at least, of the fugitives escaped; and he, the eye-witness, it is who tells the tale—Ali Moosa, chief of his escort of porters.

"The party had left the western shores of Nyassa about five days. They had started from Kompoonda, on the lake's borders (they left the Havildar of Sepoys there dying of dysentery, Livingstone had dismissed the other sepoy: of the Bombay 21st at Mataka), and had rested at Marenga, where Livingstone was cautioned not to advance. The next station was Maklisoor; they were traversing a flat country broken by small hills, and abundantly wooded. Indeed, the scene of the tragedy so soon to be consummated would appear to have been an open forest-glade.

"Livingstone, as usual, led the way—his nine or ten unpractised musketeers at his heels. Ali Moosa had nearly come up with these, having left his own Johanna men resting with their loads far in the rear.

"Suddenly he heard Livingstone warn the boys that the Mafite were coming; the boys in turn beckoned Moosa to press forward. Moosa saw the crowd here and there between the trees.

"He had just gained the party, and sunk down behind a tree to deliver his own fire, when his leader fell. Moosa fled for his life along the path he had come, meeting his Johanna men, who threw down their loads, and in a body rushed off into the deeper forest. If the Mafite really passed Moosa, his escape and that of his people verges on the marvellous.

"However, at sunset, they in great fear left their forest refuge, and got back to the place where they hoped to find their baggage. It was gone, and then with increasing dread they crept to where the slain traveller lay.

"Near him, in front, lay the grim Zulus who were killed under his sure aim; here and there lay scattered some four dead fugitives of the expedition. That one blow had killed him outright, he had no other wound but this terrible gash; it must have gone, from their description, through the neck and spine up to the throat in front, and it had nearly decapitated him. Death came mercifully in its instant suddenness, for David Livingstone was 'ever ready.'

"They found him stripped only of his upper clothing, for the Mafite had respected him when dead. They dug with some stakes a shallow grave, and hid from the starlight the stricken temple of a grand spirit—the body of an apostle of freedom, whose martyrdom should make sacred the shores of that sea which his labours made known to us, and which, now baptized with his life's blood, men should henceforth know as 'Lake Livingstone.'

"The names of those who stood before the Mafite, with Livingstone, should not be unremembered:—

Adam.	James Chooma.
Maka.	Abraham Pariella.
Simon Price.	Edward Gardner.
Albert Baraka.	Lakoombo.
Malbrook Jooma.	Ali Moosa.

Of these, four were seen dead near the corpse of Livingstone; the rest, save Ali Moosa, are missing.

"The Johanna men made the best of their way back to Kompoonda or Mapoonda, not venturing near any village or station; they lost themselves in the jungle, and were fourteen days on the way.

"At Kompoonda they witnessed the end of the Havildar of Sepoys, Bombay 21st Native Infantry. He alone of all the Indians was faithful; on the threshold of this Consulate at Zanzibar, he pledged himself at the moment of starting never to forsake his leader—nor did he; to the last he struggled on, worn with dysentery, but broke down hopelessly on the road to Marenga. A day or two later, and he would have shared his leader's fate.

"Insubordinate, lazy, impracticable, and useless, Livingstone had dismissed the other sepoy at Mataka. Had they been faithful like their Havildar, I should not have had to inscribe a record of this sad happening. Their unfitness for African travel might have been predicted. At Kompoonda the Johanna men were deprived of their weapons by the Chief, who also kept the Havildar's. Here they joined an Arab slave-caravan, re-crossed the Nyassa, and made for Keelwa, the great slave outlet on the Zanzibar coast.

"But here again, and where least expected, they encountered the Mafite. They had reached Keepareygree, eight days south-west of

Keelwa, when the appearance of a band of these savages scattered the caravan. Abandoning ivory, slaves—their all—the Arab leaders thought but of saving their lives. The Johanna men again made their escape, and reached Keelwa, whence by the kindness of the Customs people they were at once sent on to Zanzibar. They arrived here on the 6th of December.

“It will be gratifying to the many and true friends of Dr. Livingstone to learn that, when on his sad end being known, the British flag was lowered at this Consulate, the French, American, and Hanseatic flags were at once flown half-mast-high, the Consuls paying a spontaneous tribute to his memory—an example shortly followed by all the foreign vessels in the harbour. The Sultan’s flag was also lowered.

“I must reserve other details for a subsequent letter; but I may state that no papers, effects, or relics of Livingstone are likely to be recovered.

“G. EDWIN SEWARD.

“*Postscript.*—The date of Dr. Livingstone’s death is left as much to conjecture as the place of his grave.

“All that we certainly know is, that he was at Ngomano on the 18th of May last; that he proceeded to Mataka, whence he sent a despatch to this Consulate.*

“From Mataka he is said to have made for and struck Nyassa, which he crossed; but where—or where Mataka is—cannot be ascertained.

“The runaway Reuben with the sepoy state that Livingstone left Mataka a few days before they set out on their return journey to Zanzibar.

“They were one month and twenty days on the road to Keelwa, which they reached during the latter days of September. It may be inferred from this that Livingstone left Mataka about the middle of July last.

“The Johanna men named six weeks as the probable time of their return journey from Mpoonda to Keelwa with the slave-caravan. The fight with the Zulus took place sixteen days before they set out. They reached Keelwa in November (Zanzibar, 6th December). Roughly, then, we may conjecture the death of their leader to have happened during September. The statements of our informants as to time, distance, and direction, are distressingly vague and untrustworthy.

“I purpose, however, and I shall associate Dr. John Kirk with

* This despatch has miscarried.

me in the labour, to visit Keelwa with the express purpose of conferring with the leaders of the slave-caravans there. Captain Bedingfeld of H.M.S. *Wasp* has obligingly consented to take me there, on his return from assisting a wreck in the neighbourhood.

“G. EDWIN SEWARD.”

“MY LORD,

“Zanzibar, 23rd Dec., 1866.

“My despatch of the 10th inst. dealt almost wholly with the manner of Dr. Livingstone's death, and but little was said that could interest geographers. I had, however, on the arrival of the *Johanna* men, requested Dr. John Kirk—so long Livingstone's associate—to make the geography of their statements his peculiar care.

“He has, to-day, December 23, handed in his report, which I have the honour to submit, together with the track-chart, which he has been good enough to construct.

“He has, I see, conceived Dr. Livingstone's route to be almost precisely that which the explorer himself, when my guest at Zanzibar, has over and over again pointed out on the map to me, and to Arabs of rank whom I wished to interest in his travels, as the one which he had determined on. And the intention of ‘feeling his way round Lake Nyassa,’ which Dr. Livingstone records in his despatch from Ngomano, shows that up to that time he had not given up his original plan.

“I think I shall soon be able to remove any uncertainty as to the position of Mpoonda or Kompoonda on the lake littoral. I learn that it is a populous and important place on the lake borders, and one of my informants has property and a resident agent there.

“It is said that Mataka first set the Zulus in motion westward, by inviting them to fall upon some Arabs, whom he himself was too weak to punish.

“Letters have just been received, stating that many Arabs had just been killed, and that too in perilous proximity to Keelwa. Certain it is that there is a general restlessness of the tribes between the East African coast and the lakes of the interior, and that trade is becoming less and less possible; and it is to this unpropitious condition of things that we may trace, perhaps, our irremediable loss.

“It may not be uninteresting to state that a brilliant and persistent rain of meteors, observed on the same November night both here and at Muscat, has been regarded as the certain sign and portent of ills present and to come, by Arabs in high places, who

associate the troubles in the interior and along the Arabian coast with this splendid starfall.

"In penning my previous letter I had it in my mind to anticipate doubts as to the verity of Dr. Livingstone's death, by giving reasons why the event should not be discredited. That the Johanna men alone should have escaped, whilst all the rest were missing, was certainly doubt-inspiring. But the defence which they at once put forward was one which could be accepted without difficulty; the more so as, in Dr. Kirk's experiences, the order of the little column tallied precisely with that observed in Livingstone's prior Nyassa wanderings.

"He led the advance, Moosa led the baggage-men. It so happened that they rested and were at the rear, and Moosa had strolled on in advance of his party, and saw what has been recorded.

"It is not supposed for an instant that Moosa himself was seen by the Mafite; his escape unseen, and his inability to warn his people, account for the seeming marvel of surviving a Zulu onset.

"But there was one point about which there was no prevarication, no hesitation, no difference, amongst the nine men. It was the one wound that had killed, and the solemn declaration that they had buried their slain leader.

"Again it must be remembered that these men returned to Zanzibar, when it would have been easier and safer to have gone home to Johanna. They came at once to the Political Agent, and invited, or at least laid themselves open to the scrutiny and cross-questioning, which they could altogether have avoided had there been foul play, or anything in their own conduct which they wished to conceal.

"They well knew too that, either in Johanna or Zanzibar, punishment would surely overtake them, were it ever discovered that the tale of their leader's death was spurious.

"I fear that we must accept Livingstone's death as one other of those mournful sacrifices which Africa insatiably demands from those who seek to let the light fall upon the mystery of her inner lands and Pagan people.

"G. EDWIN SEWARD."

2. DR. KIRK's *Report on the Route followed by Dr. Livingstone.*

"SIR,

"Zanzibar, 20th Dec., 1866.

"I have the honour to inclose a brief account of what in my opinion was the route followed by Dr. Livingstone, and with it a rough map, showing what seems to be the probable position of the leading places mentioned.

"You are well aware how impossible it is from such data as we

possess to arrive at a certain conclusion; I may, however, assure you that there seems nothing improbable in the narrative as I have received it, in regard to its geographical features.

"The customs, moreover, of the various tribes have been kept up throughout the detailed depositions made before you, and to which I do not here refer.

"One obvious source of error again meets us here; as Moosa and also one other of the Johanna men were of our party during two years on the Zambesi, Shiré and Nyassa, and these had the same means of learning the customs as I had.

"Still I regard the sad story as true, when stripped of what was obviously meant to conceal or apologise for cowardice.

"The recovery of the later despatches of Dr. Livingstone, written at Mataka, is imperative, as they will give a clue to his proposed course of action. I think it very likely that Dr. Livingstone again wrote before plunging into the Mavite country, of which none knew the danger better than he.

"From the confused and contradictory statements of the nine Johanna men now in Zanzibar, representing themselves as the only survivors of Dr. Livingstone's exploring party, it is impossible to indicate with certainty the route followed, the nature of the country passed, or the spot where Dr. Livingstone is said to have been attacked and killed.

"A personal knowledge of Lake Nyassa and acquaintance with the various tribes have aided me in arranging what I trust may prove, in its geographical points, as approximate to the truth.

"It will be remembered that the statements on which the following is based require verification, coming as they do from men whose cowardly behaviour gives an obvious motive for concealing the truth.

"After due allowance has been made, I regret being forced to the conclusion that Dr. Livingstone was attacked and killed by the Mavite a little to the west of the north end of Nyassa.

"The last letter we have from him was written on the 18th of May at the confluence of the Niende and Rovuma, called Ngomano. From Mikindany (on the coast) to Ngomano is a distance of 150 miles, of which the first 80 is level ground, covered with thick bush and forest. The remainder is more open, and studded with isolated masses of igneous rock and low ridges of syenite and schist, which cross the river-bed and render it impassable to boats.

"At Ngomano the river is joined from the south-west by the Niende. Here Dr. Livingstone crossed the Rovuma, and remained

some time with the chief at the confluence. The country to the north had been pillaged by the Mavite, a marauding Zulu tribe now settled to the west of Nyassa. This, added to a general drought, rendered provisions scarce.

"All the camels and many of the buffaloes had by this time died from the bite of the Tsetse fly; the men were therefore forced to carry loads, and a considerable amount of baggage was left behind.

"Leaving this place, they followed a westerly course, and after a day's march again saw the Rovuma for the last time.

"On the third day, having passed several plains and tracts of forest, they ascended hill-slopes clothed with bamboo-jungle. On the seventh they were at Makarika, a small Waiao village, where they stayed two days.

"Four days from Makarika they came to Mataka, a powerful Waiao chief, having much cattle and governing a populous district.

"On leaving Mataka, after a considerable stay, Dr. Livingstone lost eleven of the Bombay sepoys and two of the educated Africans who accompanied him. His party was thus reduced to twenty-three.

"After eight days' march they came to Makata, not far from Lake Nyassa. The border of the lake presented a flat sandy shore; it seemed to be about 6 miles wide, and the opposite shore a white sand, and no mountain of any consequence near, although large hills rose to the south. From the natives of a small fishing-village under Makata four canoes were hired, in which the party crossed. Embarking in the morning, they had all landed by noon; the water was shallow and the canoes propelled by large bamboo paddles, used only at intervals.

"There is certainly no part of the Nyassa south of lat. 11° which corresponds with this description. Throughout the 200 miles formerly explored it was found to be a deep blue lake, and at the only point at all narrow enough to allow of their crossing in the time mentioned, it is not only deep, but has a mountain ridge not far off its western shore. Besides, the head Johanna man, our present informant, was formerly one of the party on the Shiré, and accompanied Dr. Livingstone on foot beyond the point referred to; and, as he positively asserts that the old route lay far to the south, I have little hesitation in placing the spot where the lake was crossed as the unknown extremity at about $10^{\circ} 30' \text{ s. lat.}$

"There is a dilatation of the River Shiré soon after it escapes from the south end of Nyassa, much resembling what has been represented as found at the northern end; and I doubt not this is

the river I heard of as coming from a marsh near Mapunda. The account I received when on Nyassa, in lat. 11°, was that Sisia, Kondowe, Photo, Matete, Mapunda, Chisanga, and N'Karamba were the various places passed in going round the north end of the lake from where I then was to a point opposite.

"I was told that Chikamba, the chief of Sisia, fought with the Mavite, that at Mapunda a river entered from a marsh, but that the lake, ended before Mapunda was reached.

"There is good reason to think that Mapunda (or Kampunda), where Livingstone landed, is the same place as that I heard of in 1861. From Mapunda Dr. Livingstone went to Marenga; after two days' march west beyond, he crossed in canoes over a marsh. Thus he left the shores of the lake, and as his first object was to settle the extent northwards of Nyassa, we may presume that he had now done so and was on his way to Ujiji, perhaps by way of Cazembe. He seemed to have followed out the course mentioned in his letter of May 13, wherein he announced the intention of going on at once from Nyassa to Tanganyika, if his operations on the former were successful.

"Leaving Marenga, where they were well treated, a desolate country was entered, a region scoured by parties of Mavite, who are at constant war with their neighbours. At the last outpost of the lake people Dr. Livingstone was told that the Mavite were then near.

"On the morning of the second day's march from Marenga, about 9 A.M., when crossing a level plain with grass 3 feet high, and scattered brush and forest, a band of Mavite suddenly appeared and are said at once to have attacked, regardless of the loss of the foremost as they dropped to Dr. Livingstone's shot. The educated African boys were, as usual, near Livingstone, while Moosa, with the Johanna men, followed at a short distance behind. On seeing that something was wrong, Moosa went forward and from behind a tree observed three Mavite close upon Dr. Livingstone, who was at the time endeavouring to reload his gun. While thus occupied he was cut down by a blow of a battle-axe, which divided the bone of the neck. Moosa fled, and with him the other Johanna boys. It seems that being behind at the time and concealed in the bush they were not observed by the Mavite. However this may be, they say they were not pursued to a distance but lay concealed, and towards evening came up cautiously to see if the loads still remained where they had cast them down. Finding none, they advanced and saw Dr. Livingstone's body where Moosa had seen him fall. The upper clothing stripped and carried off, as were also his gun and every-

thing he carried. Near him were several of the African boys dead, and in front lay two Mavite. Having buried the body of their leader they left the spot, and after a time recrossed the lake at Kampunda; but so confused is their story, that it is impossible to indicate their path to Keelwa further than that it lay north of that by which they went.

(Signed) "JOHN KIRK."

"To Dr. Seward, H.M.'s Acting Consul."

3. *Extracts from a Letter of Dr. KIRK to Sir R. I. MURCHISON, BART., dated the 9th December, 1866.*

"MY DEAR SIR RODERICK,

"Although the evidence is, in many points, contradictory in detail, and the survivors can give no clear account of their route, I find no cause to doubt their veracity in the main points of the narrative, and allow for much from the fact that an early flight alone saved them—an act of cowardice which would lead them in a measure to exaggerate some of the circumstances. One great difficulty is, that they speak the language of Johanna only, for this necessitates the use of unskilled interpreters.

"Our last communication from Dr. Livingstone was written by him on the 18th May. He was then at Ngomano, where he remained 15 days, and probably his letter was written about the beginning of that time, or soon after his arrival. We know that he started from Mikindany, struck the Rovuma about 30 miles from its mouth, and proceeded to Ngomano, without encountering any obstacle; so far the natives were friendly, but the paths were most difficult, owing to the dense forest and tangled vegetation. I need not recount what he has narrated, and what has, no doubt, been communicated to you through Her Majesty's Secretary of State; but shall briefly state, so far as I have learned, the condition of the party when at Ngomano. They mustered in all thirty-six, viz. :—Dr. Livingstone, 12 Bombay sepoy, 10 Johanna men, 9 boys (African) educated, and 4 Africans who had gone with him from the Zambezi to Bombay, where they awaited his return.

"Ngomano, on the confluence of Rovuma and Niende, is the country between these streams, so that he had crossed the Rovuma before reaching the village of the Chief, commonly named the 'N'donde.' The Niende was seen to be the main stream, the Rovuma being secondary to it. From previous expeditions we know that the Rovuma, below the confluence, is very subject to sudden rises and falls. In May it would be a considerable stream, but in October

and November a dry bed with hardly a boat-passage, and fordable every mile. Above the confluence of the Niende, therefore, it must have become a series of almost isolated pools, if the Niende was the main source. On Dr. Livingstone's arrival, the country was in a disordered state; a drought had injured the crop, and the little left had been carried off to the north of the Rovuma by a marauding tribe of Mavite. Dr. Livingstone seems to have obtained provisions from the Mabiha of the south-east, and 15 days after his arrival to have proceeded westward. The first day's march was over desert country, but the following day they again met the Rovuma, but did not cross it. They had taken a path which formed a chord to one of the river-bends, passing small villages of the Walolo, a tribe speaking the Makua language, and differing in little but the mark on the forehead from the main tribe to the south. They reached hills towards the end of the third day's march; these were clothed with bamboo jungles, but little water was found. Here one of the Africans, educated at Bombay, died. On the fourth and fifth days they seem to have crossed open grassy plains with trees; they were steadily making an ascent, as indicated by the coldness of the mornings.

"On the seventh day they were at Makarika, where they rested two days, and after eleven marches came to Mataka, a town of considerable size, the residence of a Chief, who has power over a large district and many people; these are of the Waiao tribe, the same whom we called Ajawa, on the Zambesi. This is a high mountainous country with fine scenery and abundant water. The streams passed had a south-east direction, or seemed to flow to the Niende, and one crossed on the ninth day's march from Ngomano was of considerable size.

"This region is well peopled, and has abundance of cattle, besides goats and fowls. While here Dr. Livingstone was well received by the Chief, presents were exchanged, and provisions obtained. In the short journey already accomplished, the Bombay sepoys had proved unequal to the fatigues and irregular supply of food; the cattle and camels employed to carry loads had died, seemingly from the Tsetse fly, and drilled sepoys were of no use to take their place; they were fatigued and useless. Here Dr. Livingstone discarded all, except the Havildar, who bravely stuck by him, and advanced while his men returned towards the coast, in company with a slave-caravan which passed that way, soon after Dr. Livingstone had left Mataka. An estimate of Dr. Livingstone's confidence in these men may be formed from the fact that his letters and despatches were entrusted to the chief Mataka to be given to the first caravan: these

important documents have not yet been received, although six of the sepoys have come in, and Arab caravans arrived at Quiloa. Great interest will attach to the recovery of these papers, as in them Dr. Livingstone would probably state whether he purposed again returning to Ngomano (where he had left some stores on advancing), after having settled the end of the Nyassa and its northern limits to the Tanganyika. I have little doubt myself that any idea he may have had of returning had, by this time, been abandoned; indeed, it seemed contrary to Dr. Livingstone's nature to retrace his steps, nor could he have done so without disorganising his now enfeebled expedition. His only chance of keeping the remainder together seems to have been to advance beyond the regions in which desertion was easy. Having been 15 days at Mataka his party advanced, still in a westerly course, the first day's march one of the Bombay educated negroes ran back, and returned to Zanzibar eventually with the sepoys.

"Eight days' march over hilly country took them to Makata, one day distant from the border of a lake; the chief Makata rules over a large district, extending to the waters of the lake. Whether this is the same man as the Makaka mentioned in Lieutenant-Colonel Rigby's despatch of the 15th July, 1860, relating to Dr. Roscher's murder near the Rovuma, I am unable to say; but think it extremely probable. In this case Dr. Roscher must have reached the lake further north than has been supposed, but no papers were recovered to decide with any certainty where the fatal event took place. At Makata's another Bombay educated boy deserted.

"The day following their arrival at the lake they obtained four canoes, and, embarking in the morning, were all landed on the opposite shore by midday. Comparing this water with parts of the Zanzibar Harbour, my informants, the Johanna men, estimate the width as nearly six miles, which, from the time taken to cross, seems under the truth; but it is to be remembered they are not explicit as to when they embarked. On this, however, they are decided, that water extended to the north as far as they could see, and they heard of no end in that direction. To the south it seemed still wider. They also stated that the canoes were propelled by means of poles, and paddles were seldom used. The water was not deep; the opposite shore was of white sand, with plains to the west, but no hills visible, although high mountains appeared to the south. The lake extended at this place north and south.

"That night they slept at a small village on the western shore, and, leaving the water behind, marched west to Kampunda, or, as they often pronounce it, Mapunda. The people of this place possess

only a few cattle (only a few cattle were seen in town), but they gave a goat to Dr. Livingstone, and he remained one day. One of the Zambesi boys, Wakotani by name, deserted here; and the Havildar, worn out by disease, which attacked him on crossing the Nyassa, lagged behind and was left. Dr. Livingstone's party was thus reduced to 20 men, all told; of these, however, very few knew how to handle firearms, and could be of no service in case of a determined attack by natives. They left Mapunda, and arrived at Marenga after two days' march over level land, journeying west. No hills were crossed, although mountains were seen to the south; but there was a small hill at Kampunda. After remaining a day at Marenga, they again followed a westerly course over smooth ground. Marenga, who was civil to the party, ferried them in canoes over a muddy channel or swamp, rather than river. Soon after this they passed Maksura, still keeping west, and slept one night in the jungle. They had been told that the Mavite were fighting in this part; but they had been so long near them, that Dr. Livingstone seemed not to regard it. This was to the men; but, no doubt, he was aware that suddenly he might find himself face to face with them, as happened to us on a former occasion on Lake Nyassa, not far south of this very place. The fatal attack occurred at 9 A.M. in the morning's march. As to the date, it is doubtful. If the data such as I have been able to elicit, from a mass of contradictory evidence, is to be relied on, it would be about the 15th of July; not before then, but possibly, if there had been stoppages, of which no account has been taken, as late as the end of that month. A great difficulty here occurs: for, on reckoning back from the date of arrival of the Johanna men at Zanzibar, we find a discrepancy of nearly a month unaccounted for. And whether this is to be intercalated before or after the fight, I am as yet quite unable to determine; but if the meeting with the Mavite and Dr. Livingstone's death did not happen in July, it must have happened in the following month. I am at present inclined to think it happened about the last week of July. The question of date must be held as far from being settled; but this in no way affects the more important part of the narrative. As I was saying, about 9 A.M. in the morning's march, they found themselves traversing a plain country covered with grass as high as a man's waist, and abounding in low bushes with forest-trees and dense wood at intervals, such, indeed, as is seen a little further south, where the country is known. Livingstone led the way, having next to him, as usual, the Zambesi boys and the Bombay educated Africans, while Moosa, the head of the Johanna men, drew up the rear. As Moosa is our only

authority for what happened at this time, I may state that he was about 50 yards behind Dr. Livingstone when the boys passed the word from the Doctor in front that the Mavite were seen a little distance off. On this he ran forward, having with him his loaded rifle. When he had reached within ten paces of Dr. Livingstone, the Mavite were near and charging, their heads dressed with feathers visible above the large Caffre shields of ox-hide. Their arms were spears and battle-axes. On seeing Dr. Livingstone and his boys with levelled muskets, they checked their charge for a moment, and came on with a hissing sound when they found they were not fired on. Dr. Livingstone then shot the foremost man; he dropped dead; the others fired, and, as the smoke cleared away, Moosa saw three men facing Dr. Livingstone. Moosa was at this time standing behind a tree, in order to fire. Seeing the Mavite suddenly so close, he appears to have been panic-stricken. Dr. Livingstone had emptied his gun, and was endeavouring to reload, when faced by these three Mavite, who cut him down with a blow from a battle-axe which severed the neck-bone, so that the head dropped forward and he fell instantly. What happened on the field after this is unknown. Moosa ran off, and having been behind probably was unseen, while the Mavite attacked those who were with the Doctor and had fired.

“Moosa in his flight met his men; they had already heard the firing a little way in front, and were prepared to throw down their loads and make off. This they now did, and ran to a distance, where they hid themselves in the bush. Near sunset they came out; and, desirous of seeing if any of the loads still remained, they stealthily approached the place. Finding nothing where they had thrown them down, and seeing no one, they became bolder and cautiously advanced, when they saw Dr. Livingstone's body stripped of all but the trousers, and presenting one wound in the back of the neck. They scraped a hole in the soil, and placed the body there, covering it over with earth. They did not stay longer; near Livingstone's corpse were the bodies of two of the boys, which they recognised in the dim light by the ragged trousers still on them. The corpses of two Mavite lay near, it might be 20 yards off, their shields by their sides, but spears and axes had been carried off. Nothing remained to bring away, the Mavite had taken all; the nine Johanna men who have come back saw two boys dead. One Johanna man and all the Bombay and Zambesi boys are missing; and there is little chance that any one of them ever returns, taking as truth the statements solemnly made by the Johanna man and his eight companions, who all declare that, although, with the exception

of Moosa, none saw Dr. Livingstone fall, yet they assisted afterwards in depositing the body in its shallow grave.

"I shall not now follow in detail the narrative of the return journey. Dr. Livingstone was gone; it has, therefore, little interest. It was only a gang of ignorant negroes, destitute of everything and fearing every man they saw, endeavouring first to avoid habitations, then joining a coast caravan, which they met after crossing the lake at Kampunda. On the way to the coast at Quiloa the party was suddenly attacked by a party of Mavite and dispersed. Every one fled, the Johanna men now for the second time; ivory and slaves were abandoned and left to the will of the dreaded marauders. No account is given by the Johanna men of their having crossed the Rovuma on the return journey; but they crossed some river-beds, at that time dry, with pools of water in them. No doubt one of these was the Rovuma, which could be little more than as described in the dry season before the junction of the Niende, its chief supply.

"Thus has ended what at one time promised to be an expedition rich in results, and we must again pause in the march of discovery, leaving the map of Africa a disconnected string of lakes, every one of which is incompletely surveyed. Beginning at the north, the Victoria Nyanza is known only at its north and south ends; the intermediate coast on the west side has not been seen, and the east is entirely hypothetical, beyond the simple fact that it must have limits in that direction. As to the Albert, but a small part is known, and, like the Tanganyika, its north and south ends are as yet a blank. The southern end, however, is now the only one of interest, on account of the possibility of its uniting with the Tanganyika, and thus moving the Nile sources far to the south, and proving the Portuguese who visited Cazembe to have been the first to reach them.

"I do not say that such a thing is probable; I believe it is not. I suspect, however, that Dr. Livingstone was satisfied the Nyassa did not extend far beyond where he crossed it, if, indeed, it was the Nyassa that he passed over. His first object and one of his chief aims was to determine the extent of the Nyassa northwards, and it is very improbable that he would push on into an unknown and decidedly dangerous land beyond it, leaving this important point unaccomplished. That it was the northern prolongation of the Nyassa I am decidedly inclined to believe: for, firstly, the general direction from Ngomano—which was west—would lead him there. It could be none of the southern crossings by which he traversed the lake, for indeed no part of the lake south of lat. 11° s. is shallow,

certainly nowhere could it be crossed in canoes propelled by long bamboos. On the western side, also, there are hills at all the crossings, except at Kota Kota, and there the lake is wide. I believe that Dr. Livingstone first came upon the lake nearer lat. 10° , where the lofty mountains which were seen by us further south, on both sides, have subsided. The precipitous rocky borders of the Nyassa, in lat. 11° , are too marked a feature to escape the observation of the most obtuse, and the Johanna men all speak of the land on both sides as flat, the shores sandy, and the water shallow.

"I find in my note-book, under date 7th October, 1861, when at the foot of the hills inhabited by the Mavite on the shore of Nyassa, the following entry:—'Sisia, Kondowe, Photo, Matete, Mapunda, Chisanga, N'karamba; places between this and the other side, keeping by the bank. Chikamba, the chief of Sisia, fights with the Azitu (another name for the Mavite). The lake ends at Photo Shingo and Matete. At Mapunda the lake is narrow.' Such was the information I collected regarding the lake when returning, after having explored and mapped 200 miles of its extent, but failed to reach the northern extremity, which seemed so near. I was told elsewhere that a river came from a marsh and joined the lake at the north, and also that there was a large river, the Ruvu. Mapunda was said to have cattle, and the lake to end, not at one place, but at the three above-named places, which were at the same time some distance apart.

"I am now inclined to believe that the Mapunda of this account is the Mapunda or Kampunda mentioned by Dr. Livingstone's Johanna men. We may yet obtain some information on questioning Arabs and natives of those parts. I have endeavoured and yet hope to find the native boy who was with Dr. Roscher at the time of his murder to the east of the lake; something, too, may be learned from Bombay, the head man of Speke's expedition, who is himself of the Wahiao tribe, and a native of the country on this side of the Mavite.

"You may rest assured that nothing will be left undone to elicit information by the Consul or myself. Full depositions will be sent home by the former, together with all other information, authentic or otherwise, we can obtain. We may say of Dr. Livingstone that his end came mercifully at last: few minutes seem to have elapsed between the first appearance of danger and the fatal blow.

"Let me close this very hurried letter, impressing once more on you that the information it contains is the result of an imperfect investigation; much has still to be elicited, much never will be

known. If I disbelieved the story, you know I would be the last to repeat it; but I do think that substantially, although not in detail, it is correct.

“JOHN KIRK.”

4. *Extracts from a Letter of DR. KIRK to SIR RODERICK MURCHISON, dated the 19th December, 1866.*

“DR. LIVINGSTONE had told us, in despatches of the 18th May, that north of the Rovuma, beyond the confluence, the Mavite, those emigrant Zulus mentioned by us as seen to the north-west of Nyassa, and as having migrated from south of the Zambesi about forty years ago, were devastating the whole country. He remained some time with the chief of Ngomano, at the confluence of the Niende (or Loende) and the Rovuma. Dr. Livingstone's predecessors on this route were the lamented young German, Dr. Albrecht Roscher, murdered by the people between the Rovuma and the Lake, and the late Baron von der Decken, who was driven back and since murdered farther north. But Livingstone has always passed where others failed, and he did so here. He advanced from Ngomano, first through level forest-land, thinly peopled, and afterwards through a mountainous region inhabited by the Waiao and Makua tribes, among whom he found good treatment, instead of treachery. But his party at the same time became thinner. The Bombay Marines collapsed, all but the Havildar, who followed his chief when the rest of his men returned to the coast. Some of the educated natives also absconded. He went on with the remaining Africans, the Johanna men, and the Havildar. The country he was in possessed a cool climate, and was peopled by scattered villagers, ruled by chiefs of considerable power, rich in cattle.

“He arrived on the eastern shore of Nyassa, at a place where the lake seems to have been narrow, and, what is more wonderful, shallow; but take native tales for what they may be worth. It is commonly asserted by the survivors that they were taken across in canoes propelled chiefly by means of long bamboos, and that, embarking in the morning, they had all crossed by noon. The shore on both sides was flat, but hills appeared to the south. I believe this was a little to the north of where I have placed the end of the lake in the map I communicated to the Royal Geographical Society, and which is published in the ‘Journal,’ volume xxxv. (I believe that this shallow water crossed by Livingstone was the river I heard of; which is said to come from a marsh.)

“Livingstone's first object, we know, was to determine the northern

limits of Lake Nyassa. I conclude that he had satisfied himself of this point at once, for had he not, most assuredly he would have taken canoes and followed up the water to the north. Certainly he would not have turned his back upon it, and advanced beyond into what he well knew to be a dangerous region, to encounter or chance a meeting with those savages who had once before turned his route.

"My impression is, he had satisfied himself that this shallow (if shallow it be) continuation of Nyassa did not reach far, that it was of no importance, and therefore probably had no current. He crossed it with the intention, as he told us, of pushing on to Tanganyika from Nyassa, if all went well. The desertion of some men, and the death or invaliding of others, had so weakened his party that he must have seen that a return to the Rovuma confluence would have closed the present expedition. He knew that his chance was, having got the men, to keep them marching on further from home and the hope of a successful flight.

"On the west of the lake the villagers were civil, and warned him of the Mavite in front, with whom they were at war. These seem to be the same Mavite who send out marauding expeditions to the south of Nyassa and eastward, even to within eight days' march of Quiloa. Their language is still Zulu, although the blood is mixed by intermingling with the captive races they have subdued. From Mapunda, on the west side of the narrow portion of the lake, they marched to Marenga, two days' journey distant. Marenga was civil, and ferried the party over a marshy tract of mud, which they might have gone round by a *détour*. The outlying villagers warned them that the Mavite were out, but Dr. Livingstone heeded not what they said; indeed, since leaving Ngomano he had been marching in a land full of fear and dread, and no doubt had come to look on the Mavite as few and far between, and the chance of meeting with them as small; or possibly he had determined to go straight at their headquarters, and thus try to reach their chief. When he had journeyed a day and a half from Marenga, about 9 A.M. the party was suddenly attacked in plain ground, covered with grass three feet high, and scattered jungle of forest and bush. Just at this time they seem to have been in a thicket, so that the Johanna men, at a little distance behind, did not see Dr. Livingstone and the boys in front. Moosa, the head man of the Johanna party, did, and witnessed the scene from behind a tree. Dr. Livingstone, who had just emptied his gun, endeavoured to re-load, while three Mavite appeared close on him, and one of them cut him down with one blow of an axe, which pierced the neck, and caused instant death. As he sank, the head

dropped forward. Moosa ran off, and it is very doubtful, on his own showing, whether the enemy saw him. Meeting the others, who had been warned by the shots, they joined, and all fled to a distance, where they remained concealed until evening, when, returning to seek for the loads they had cast down, and not finding them, they advanced cautiously, and saw the body of their leader where it had fallen, with but one wound in the back of the neck; the upper clothes had been stripped, and everything carried off.

"We are at the mercy of our informants, but they tell a tale such as I believe, for had they invented it they would have made a story more to their credit. Nothing has come to us, not a relic or thing to show, and none but Johanna men have returned; yet I think their position behind, and the fact of their escaping before being seen, may account for this.

"I fear the tale is true, much as I could wish to think it was otherwise.

"You may imagine how I feel, being the first to communicate the sad news regarding my leader, whom I had known, I may say, far more intimately during the Zambesi expedition than any other member of it. On all occasions I was his companion, when there was rough work to do. I could never wish a better leader; and now I often think what might have been the result had there been some one near him to use his rifle with a steady hand, and not stay cowering to see the murder from behind a tree, as did the head Johanna man; true, he could not use his gun, and I believe had no ammunition. I must close, and I wish, in doing so, it were with the hope that all is false; it may be so, I hope indeed it is, but confess it is hope against hope all the while.

"JOHN KIRK."

5. *Results of the Enquiry at Quiloa.*

The following Despatch from Dr. Seward and Letter from Dr. Kirk relate the results of their journey of enquiry to Quiloa:—

"MY LORD,

"Zanzibar, 26th Jan., 1867.

"I have the honour to inform you that, in pursuance of an intention expressed in my last despatch concerning the asserted death of Dr. Livingstone, I have personally made inquiries amongst the traders of Keelwa and Kivingi, and have gathered information there which tends to throw discredit on the statement of the Johannamen, who allege that they saw their leader dead.

"The evidence of the Nyassa traders strengthens the suspicion that these men abandoned the traveller when he was about to

traverse a Mavite-haunted district, and, for ought they know to the contrary, Dr. Livingstone may yet be alive.

"I purpose sending details by the next mail, and have the honour, &c.,

(Signed) "G. EDWIN SEWARD."

"MY DEAR SIR RODERICK,

"Zanzibar, 28th Jan., 1867.

"We have visited the once famous Quiloa, now a deserted port, with a few wattle-and-daub houses, an Arab fort falling to pieces, and the last remains of the old Portuguese defences. The trade of Quiloa has gone to Kivingi, about 7 miles further north, on the coast where, behind an intricate barrier of reefs, the slave-trade may safely be carried on; for Quiloa is the chief resort of the Nyassa caravans, whose business is in slaves.

"These Arabs and Sowaheli traders have passed even from Zanzibar to Loanda (on the western coast of Africa), and traversed the Lake regions in every direction; but their business is not geography, and it is their interest to give as little information as possible: besides they cannot, if they would, describe a new land. They go for ivory and slaves, and care nothing about lakes and rivers, unless they stand in their way and delay progress. Some caravans follow the same route as that by which Livingstone went to the lake: they even cross it, or rather a marshy creek, at the northern end, where he did; but they avoid the land of the Mavite. From what I know of the lake they cannot pass south; we may conclude that their route is to the north-west, just in the direction required to reach the Tanganyika.

"We may consider it now settled that the Nyassa ends in the tenth degree of south latitude; for Livingstone would not have left that point doubtful: where he crossed in canoes [the lake] was very shallow and narrow; the country was level and marshy, and seemed just like the region to the south, where it ends, and where, yearly with the rise of water in the lake, considerable tracts are flooded. Had Livingstone suspected that this marshy creek came from another lake he would have followed it up. Instead of this he set out seemingly for the rivers which flow to Cazembe, and probably to the Tanganyika.

"From the little heard at Quiloa I can find nothing to encourage us in hope. The story has been confirmed in so far that Livingstone crossed the lake; but if the tale be true, we never shall hear more. It would be easy to send a native to the lake; but no one can pass among the Mavite. We may still hope for letters and even portions

of diary, although I suspect the Arabs have destroyed them, fearing disclosures regarding their atrocities, which are well described by Baker.

"The Lake regions cannot possibly be left as they are: the decisive journey has yet to be accomplished. We know that lakes exist, and a few points on their shores have been seen; but of the Lake regions we know little indeed, when we know not whether the Tanganyika discharges its waters to the north, south, or west. We know not where the Albert Lake extends; the Victoria Nyanza is not the lake figured on the map. Whoever traverses the chain of lakes will find fame with much greater ease than those pioneers who reached their shores and first demonstrated their existence. I believe the best plan would be to traverse Unyamwezi and remain on Tanganyika, which can be examined by boats built of native timber, and native African carpenters may easily be found. The road thither is easy, although long, and at Kazé a dépôt may be formed. The Nyassa Lake I consider disposed of, and a boat on Tanganyika could settle whether the Cazembé streams enter at the south.

"To Sir Roderick Murchison, Bart."

"J. KIRK."

The PRESIDENT said he could not, as an old and dear friend of Livingstone, avoid clinging to the hope that he was still alive; and that he might be at this very moment on that Lake Tanganyika which he had gone out to explore. If he only succeeded in passing the narrow tract inhabited by the warlike Mavite, he would be comparatively safe, and so far from the lines of communication that it would be impossible to hear of him for many months, except by the accident of some Arab trader bringing down the intelligence to the coast. It was on this account, and trusting to the last despatch from our Consul, officially reporting what he had heard from the Arab traders as to the untruthfulness of the Johanna men, that he thought there might still be some hopes—he would not say very sanguine hopes—that their illustrious friend was not dead. At all events, they ought, before they decided, to have better evidence than that of these men, all belonging to one tribe, and not, like the negro Africans, attached to Livingstone, but only his baggage-bearers, and in the rear, and who were described as a cowardly race. If any of these negroes, several of whom were said to have escaped, had returned and told the story, they might then believe it. And why should they not have returned, if their leader was dead, as well as the Johanna men? He thought it was their duty to cling to the hope as long as they could, until some more decisive evidence was obtained. Passing from this subject, he hoped the discussion would turn upon the general condition of our geographical knowledge of Africa at this moment, as compared with what was known before the discoveries of Burton and Speke. He had in his hand a document drawn up by Mr. Findlay, in which four stages in our knowledge of the lakes were represented. First, there was the discovery of the Tanganyika Lake by Burton and Speke; then, the discovery of Victoria Nyanza by Speke, and the great journey of Speke and Grant; and, finally, the discovery of the Albert Nyanza by Sir Samuel Baker—a discovery which had led to the idea of Tanganyika Lake having a communication with the Albert Nyanza. The great object of Livingstone's journey was to reach the northern end of Tanganyika, and solve that

problem completely. In hoping most ardently that Livingstone had escaped, they would see what a wide field of exploration was open to him. It was upon this feature of the question that he wished the discussion to turn.

Sir SAMUEL BAKER said the news of Livingstone's death lay so heavily upon his mind that he could not speak of the lake system of Africa without first expressing his opinion respecting the fate of the great traveller. From his personal experience in Africa, of nearly five years, he was compelled to differ in opinion from the President. For his part he felt perfectly certain, from the evidence that had been laid before them, that they should see Livingstone's face no more. To him, who knew the native character, which was the same—exceedingly brutal and savage—throughout Africa, it was no wonder that Livingstone was killed: it was only a wonder that one man out of a hundred ever returned from that abominable country. The death of Livingstone had given a check to African exploration, and he felt perfectly convinced that for a long time to come the centre of Africa would be closed to us. Although we had done much, still we knew but little. We knew that lakes existed, but we had not been able to explore well any one of them. We had reached certain lakes, still their extent was perfectly vague. He felt certain that no individual enterprise would ever open Africa, except to this extent,—that an unfortunate traveller, weary and toilworn, might return to the Geographical Society and state with all humility the little that he had done. With regard to Livingstone, he was perfectly convinced that, as Baron von der Decken and Dr. Roscher had been killed, and Mrs. Livingstone had left her bones in Africa, so Livingstone had fallen a sacrifice; and although they could not erect a monument to his memory on the place where he fell, yet his name would live in their hearts as that of a man who had nobly done his duty. Returning to the lake system of Africa, the only question of importance at the present moment was whether the Tanganyika Lake were really the head-water of the Nile, by means of a communication with the Albert Nyanza. He did not share in the opinion of Mr. Findlay on this subject. It was impossible to know anything that existed in Central Africa until we explored it personally. There were people in England who talked about the source of the Nile and the Niger and other rivers, who would have more hesitation in expressing an opinion upon the sources of the Severn and the Thames. His own opinion was, from the altitudes he took, that there is a ridge on the equator in Africa, about 4000 feet above the level of the sea, with a northern and southern watershed; and that the great rivers of Africa have their source in these great high lands. To the north there will be the Nile, which flows into the Mediterranean; to the west the Niger flowing into the Atlantic; and to the south there will be the Zambesi on one side, and the Congo on the other. With regard to the supposed connection between the Tanganyika and the Albert Nyanza, they could adduce proofs against the theory by comparing the altitudes of the two lakes. On the north the Albert Nyanza is 2700 feet above the sea; on the south the Tanganyika, according to the altitude given by Burton and Speke, is only 1840 feet: therefore, if those altitudes were correct, the question was settled against the Tanganyika having any connection with the Albert Nyanza. On the other hand, he must confess that he shared very much the opinion of Mr. Findlay, that the altitude of Lake Tanganyika, taken with a bar thermometer, could not be depended upon. As the question rested in that uncertain state, and Speke and Livingstone and all the travellers had done their best, he would suggest that there was plenty of room for those who adhered to theories to carry them out by personal investigation; and he hoped that not only would there be an expedition to discover what had become of Livingstone, but expeditions also to ascertain the truth of this theory as to the connection between the two lakes. He should only be too happy to take charge of one of them.

The PRESIDENT observed that there were some points connected with our knowledge of the African interior which Sir Samuel Baker had not alluded to. It was well known to geographers that, far to the south of the country which Sir Samuel Baker had explored, Portuguese subjects had traversed those regions more than once or twice, and they had been traversed besides by numerous native traders. He wanted to recall the attention of the meeting to the possibility of Livingstone having got upon one of those routes which the Portuguese used to take, viz. Tete on the Zambesi and Cazembe, or the slave-route between Quiloa and the far interior. Now if Livingstone be once far advanced on these routes, what difficulty was there in his going forward in safety to Cazembe? They had no evidence to rest upon, he repeated, but that of the Johanna men, and, until they had better evidence, he never would believe that Livingstone was dead. He would not, therefore, put the Society into mourning for the death of Livingstone. He would still cling to those rays of hope which the last despatch from Dr. Seward at Zanzibar justified.

Mr. J. CRAWFORD was sorry he felt obliged to agree with Sir Samuel Baker and to differ from the President. It would have been very satisfactory if they had had the actual depositions of these Johanna people. They were said to be cowardly, but they were not more cowardly than the Sepoys, who ran away long before the massacre occurred. They were said to be liars, but there were many of the same description in their part of the world. Seventy years ago, Sir William Jones gave a very favourable description of these people in the 'Asiatic Transactions.' They would observe that the last despatch, in which was expressed the hope that Livingstone was alive, was by Dr. Seward, the Acting Resident at Zanzibar. Now, Dr. Kirk, a friend of Livingstone, a man who had travelled in the interior, and who was better able to judge than Dr. Seward, expressed no hope whatever in his letter of the very same date.

Mr. HORACE WALLER said he was with Dr. Livingstone many months in Africa on the River Shiré, and knew many of these people whose names had been mentioned to the meeting. He had met with men of the Mavite tribe. They are a terror to the Portuguese; and although Dr. Kirk imagined that they crossed to the northward of the Zambesi forty years ago, he was led to believe that this particular band, who were killing everybody right and left throughout the country, only crossed in 1856. It had been stated in the public papers that Dr. Livingstone, before he struck the lake, had been in collision with the slave-dealers. He had the pleasure of telling them, from letters he had received within the last few days from Zanzibar, that Livingstone had not been in collision at all with the slave-dealers. As to Ali Moosa, he knew him very well; he was the head of these twelve Johanna men; but he was thoroughly untruthful, and would lie through thick and thin whenever it answered his purpose. Moosa was a man he would not place confidence in at all. But Dr. Kirk had been there: he knew Moosa, and he knew all the men; and he was the most likely man of all who had been upon that coast to come to a sound conclusion. He must say he placed faith in the sagacity of Dr. Kirk, and whatever opinion Dr. Kirk entertained with regard to the fate of Livingstone he must entertain. He would add, that one of the two African boys supposed to have fallen with Livingstone was reported to be in safety, having left the expedition when it reached the shores of Nyassa. These boys, in common with many others who were now at the Cape, were amongst those negroes who had been liberated by Livingstone from the slave-dealers in 1861, and they had always shown the greatest regard and affection for the Doctor. He had received a letter from Zanzibar within the last few days, telling him that one of these boys, in crossing the north end of Lake Nyassa, had met with some of his tribe and with one of his sisters—from whom he had been separated since 1860—and the boy remained behind. This was about five days prior to the murder. The other boy, of whose bravery he could personally speak, fell fighting

by his master's side. Ali Moosa, when on his way back from the spot where Livingstone was killed, saw this boy again on the shores of the lake. Now, it had occurred to him that if any inquiry was to be set on foot, this boy would be a most valuable help, for he spoke and wrote English, and respected English people. With regard to the Mavite, they were a lawless set; but he doubted whether they would be so to the incoming of white strangers, because they are not in league with them at all. When Livingstone met with them on his previous journey, they were the terror of the whole country; but, upon his men speaking to them in the Zulu language, they made off and did not molest him. Therefore, he could not conceive what object these men would have in attacking him, unless they had been bought over by the slave-dealers or some other means. Sir Samuel Baker had indulged in a gloomy foreboding of the fate of Livingstone, the interior of Africa would be closed. For his part he had no fear that Africa would remain the *terra incognita* it had been in past ages. Let them—and it was the moral to the story—determine to deal with what was the real curse of that country, and the real danger to exploration. It was the slave-trade. He had lived for three or four years in the midst of the most terrible scenes that it was possible to imagine. At the present moment there was a slave-trade going on there that was little known. Colonel Rigby and Colonel Playfair had told him that 25,000 slaves passed through Zanzibar in the course of the year. With the slave-trade thus flourishing, they could imagine what a difficult task it was for the traveller to pass through the country. It was this difficulty which Livingstone had dogged his steps and thwarting his brave efforts; and, if he has fallen, he has fallen in facing an enemy that he has always faced, and which he struck when he first knew the Zambesi.

Captain SHERARD OSBORN said he thought the arguments used by Sir Samuel Baker against theorising with regard to the lakes of Central Africa, were perfectly applicable to the question of whether Livingstone were alive or dead. Our data in both cases were very imperfect. The fate of Livingstone at this moment was remarkably analogous to that of Franklin in 1848. Franklin was missing, and there were plenty of people ready to come forward and produce indubitable proofs that Franklin had perished close to the threshold of his work. He and others doubted it strongly; but so fiercely was the question agitated that some of the best and soundest authorities in this country were disposed to relinquish the idea of Franklin's pushing forward then, as he believed poor Livingstone might be pushing forward now. He held that they, as members of the Geographical Society, should act upon the broad principle that, until they had positive proof of the death of Livingstone, or any other explorer, it was their duty not to cease their efforts to rescue them. If it were easy for the slave-trader and the missionary to traverse Africa, he maintained that other men could penetrate to Lucenda and see if Livingstone had left that place in safety, and bring back any papers he might have left there. If Livingstone had fallen, he believed that the efforts made to solve the mystery of his death would lead in all probability to the clearing up of the mystery of the African Lake regions, just as the problem of the northern Polar regions had been solved in the search for Franklin.

Mr. BAINES said, as one who had been with Livingstone eighteen months in Africa, he wished to bear testimony to his perseverance and ability as an explorer. With regard to his reported death, he himself had been reported dead, and in 1860 or 1861 it was stated that Dr. Livingstone had been killed; but the editor of the Cape paper added very sensibly that Dr. Meller, who brought down the letters had previously been reported dead, and had come out alive. Mr. Baines said he did not give up hope; at the same time he had very great fear, founded on the conclusion Dr. Kirk had come to, who would not be easily deceived by the natives.

The PRESIDENT, in concluding the discussion, said he was glad to find that

gentlemen well acquainted with parts of the region recently explored, had, as well as himself, a hope that Livingstone might be still alive. Although it was a ray of hope only, they would, he was sure, agree with him that an expedition should be sent out to clear up this painful question. Until that was done, he (the President) should remain in doubt as to the death of the great explorer.

ADDITIONAL NOTICES.

(Printed by order of Council.)

1. *Notes on Rangoon.*

[Extract of a Letter from Mr. ALEXANDER BROWN to Mr. JOHN FLEMING, dated Rangoon, 15th Feb., 1867.]

"It would appear that Moulmein has been going down the hill in importance, or at least that Rangoon is so fast advancing in prosperity and importance that Moulmein has already lost its relative importance to it. The position and accessories of the two ports are very different. Rangoon is on a magnificent river, with no difficulties of navigation, communication direct with the frontier of British Burmah, and thence with the most important provinces of Burmah Proper. It is the outlet, in fact, of the whole country: its rise has been most remarkable. In 1852 it was nothing, and now it is a large and flourishing city with 60,000 to 70,000 inhabitants, and is still steadily extending. It is the head-quarters of the rice-trade (Bassein being so near, only some two or three days' journey through the creeks, can easily be worked as a subsidiary to it), and must be the outlet of all the produce of Burmah Proper, when it comes in course of time to be developed. At present there is a temporary check to the prosperity of Burmah generally, owing to the unsatisfactory state of matters in the King's territory (or Burmah Proper). His oppressions, extortions, and cruelties, have reached such a point as thoroughly to incense the people against him. There has already been a serious rebellion, and though it has been for the time quelled, yet the universal opinion is that things are rapidly working up towards another and more serious outbreak; and it seems more than probable that ere long our interference, and probably the annexation of the whole country, may become an imperative necessity. It would appear that the Burmese would hail such a result with delight, as they can contrast the state of matters in British Burmah with that in Upper Burmah. They are a most intelligent race of people, and what little one sees of them on a short visit like mine, impresses one most favourably with them in contrast with the natives of India. Though Bhooists, they seem utterly without the prejudices; or at least the narrowness of mind, of our natives. They have a complete national system of education, every boy being obliged by their law to reside for three years in a kyoung, or religious house, where they serve the poonghies or priests, and are educated by them in reading, writing, and the elements of arithmetic, as well as in religious knowledge. The system is a very wise one. The priests, of whom there are vast numbers, live in the kyoungs; they are celibates, and I believe, as a rule, very chaste. They never handle money, and are supposed never to see it. Each morning they, and the boys in their charge, go round the village, and at each house get a portion of rice and other food ready cooked, on which they and the boys live.

The boys are thus boarded for three years, free of direct cost to their parents, at the expense of the whole community, and both acquire habits of restraint and submission to authority, which could not possibly be the case at the same age at home, and obtain a simple vernacular education sufficient to carry them through life. The females are entirely uneducated, and it is said to be as hard to find a woman who can read or write in Burmah, as a man who cannot do both. Nevertheless the women seem to be fitted by nature for keeping their own place in society. They are excellent merchants, and they say a great many of the bargains for rice and other produce are effected by them. They can keep their husbands in order, and slipper them when they misbehave; a curious example of which I saw in passing through a village not far from Moulmein. A Burmese girl, who lived with a Mahommedan from India as his wife (having cause to be jealous), dragged him out into the street, seized him by the turban, took it off, stripped him of what money he had, gave him a good beating with her fists and her slippers, proclaiming most vociferously his fault to all the bystanders, not one of whom interfered; the miserable wretch taking it all as if it were his due. I was told such scenes were not uncommon.

"The Burmese have many of the characteristics of the Chinese, are ingenious and enterprising, though lazy. They have much independence of spirit, and nearly all the menial labour in British Burmah is performed by Coolies from India. Altogether they are a race well calculated, under good government, to make far more of a country than ever the Hindoos could; and were this only secured to Upper Burmah, there must be a great future before the country, and Rangoon could not fail rapidly to become a place of the utmost importance.

"Moulmein, on the other hand, has many drawbacks; the approach to the port is very difficult and dangerous. The River Salween, though a splendid stream, is unnavigable beyond about a hundred miles, on account of a serious barrier of rapids. There is little or no rice-trade, and nothing, in fact, to depend upon but the teak-timber trade. Owing to the extremely depressed state of matters with regard to teak, the place is for the present almost dead, and merchants, who formerly used to consider it their head-quarters, have now merely a subsidiary agency there."

2. *Exploration of the Endeavour River, Cape York Peninsula, Australia.*

By JOHN JARDINE, Esq., Police Magistrate, Somerset, Cape York.

On the morning of 27th September, 1865, accompanied by my son and three of the officers of H.M.S.S. *Salamander*, having by the courtesy of Acting-Commander Yonge been furnished with a boat and crew, I entered the Endeavour River, and proceeded with the tide for 3 miles, where the mangroves which cover the low country round the mouth cease, and the river takes a decided form, flowing in a width of 400 yards, between moderately high banks of a reddish clay, overlaid by a layer of light vegetable mould. The country on either side lightly timbered with bloodwood, Moreton Bay ash, &c.

Following the course upwards for about 15 miles further, the description of the river as given in the Admiralty chart was found to be correct in all respects, with the exception that the tide was not met with till the head of the tide was reached—a distance of 3½ miles further than the survey goes. This may readily be accounted for by the unusual dryness of the season, evidences of which were everywhere visible. At this last point the channel becomes very narrow, with a depth of water of about 5 feet, and it terminates abruptly in a small basin below a bar of slate rock.

To this point the general course of the river was N.E. by N., when it turns to N. by W., and continues in that direction to a remarkable gap in the Main Coast Range in which the river appears to take its rise. The range here is

17 miles distant in a direct line from Grassy Hill, at the entrance of the river.

I followed the upward course of the river for about 2 miles above the tide. The stream had ceased to run, but there was abundance of water in large rocky pools. The banks on either side were high, and the country level, of red soil, well grassed, and moderately timbered. I saw no scrub, except on the small alluvial flats by the river-side. These were covered with vine-scrub usually seen in such situations. The trees were large white gum, melaleuca, silk-cotton, white cedar, Moreton Bay chesnut, and coral-tree growing to a very large size. Plenty of game was seen, and a small party of natives, who made off as soon as they saw us. I estimate the distance travelled to be, by the river, 21 miles, and in a direct line, 12 miles from the mouth of the river.

On reaching the boat at dusk it was found that one of the crew had received a wound from the accidental discharge of a rifle, so severe as to make it necessary to return to the ship without delay; and it was reached before daylight next morning.

A boat was again kindly placed at my disposal by Commander Yonge. I did not, however, consider it necessary to resume my examination of the upper part of the Endeavour, but proceeded to search the land in the neighbourhood of the entrance for fresh water. Landing on the south side, under Grassy Hill, accompanied by my son and Lieutenant Edwin, R.N., I proceeded along the base of the range, ending in Mount Cook, and found all the water-courses dry, with the exception of one marked "fresh" in the chart. In that a small quantity of water, putrid, and quite unfit to drink, remained. I ascended a prominent point in the range, and had a view of the river winding through a broad valley, the country consisting of lightly timbered low ridges. The soil of the neighbourhood of Mount Cook consists chiefly of poor clay; the ridges are strewn thickly with broken clayey slate. The timber is chiefly stringy-bark and bloodwood. Mount Cook itself is of granite formation.

As there was no water to be found on the south side, we crossed to the north of the river, and at the head of a watercourse which runs into the sea at the foot of Mount Yonge, about 2 miles distant from the beach, good pools of fresh water were discovered. This was the only fresh water I could find in the neighbourhood, though doubtless there was more, as the natives were numerous.

The whole of the point formed between the sea-beach and the north arm of the Endeavour, appears to consist of mangrove-swamp and sandhills, covered with bent-grass and small brushwood, chiefly banksia: a few small trees of sandalwood were met with here; but I did not succeed in finding any further up the river, or of a sufficient size for trade.

It is to be regretted that the scarcity of water near the mouth of the Endeavour River forms so strong an obstacle to its occupation as a settlement. It must, however, be borne in mind that the present has been a most unusually dry season. Although the country in the immediate neighbourhood of the port is by no means inviting in quality, still the upper part of the Endeavour Valley, commencing, say, at a distance of 3 miles from the coast, is of a much better description, and well adapted for grazing cattle. The upper part of the valley is also well watered.

The port, though small, is convenient, and has the advantage of an entrance with 10 feet of water at low tide. There is also a depth of water at the foot of Grassy Hill, sufficient for a vessel of considerable size to lie within a few yards of the shore. I am informed by the master of H.M.S.S. *Salamander*, that, on examination, he finds no alteration has taken place in the soundings at the entrance of the river, as given in the Admiralty chart.

I have carefully examined the coast from Rockingham Bay to Somerset, and can see no other place which offers the appearance of being at all suitable

for settlement, except the Endeavour River. With all its disadvantages, its position—nearly central between the two places before named—and being so near to the tracks of ships passing by the inner route, must, I think, give it a preference. Its situation, also, in respect to the country, reputed to be pasturable, on the heads of the Mitchell River, and also near the Kennedy River and Princess Charlotte Bay, would be convenient.

Having read the evidence given before the committee for the steam postal communication through Torres Straits, it appears to me that if it is the determination of the Queensland Government to establish a line by the inner passage, it will be indispensable that marks and beacons, and perhaps lights, should be placed at many points along the route. It will, of course, be necessary that such marks and beacons should have continual attention, to see that they are not displaced or destroyed. This duty could be best performed from stations along the coast; and, as the most intricate part of the navigation of the inner passage, and that most requiring marking, lies between the Endeavour River and Booby Island—a distance of 400 miles—I think that no two more convenient places than the Endeavour and Somerset could in the first instance be selected for such stations.

I would here suggest that much valuable information on the subjects connected with the navigation inside the Great Barrier Reef might be obtained from Mr. C. Edwards, of Sydney, who, for a number of years past, has been, and still is, engaged in *bêche-de-mer* fishing on the islands and coral-banks of these seas, and than whom, I believe, no one is better acquainted with the tides, currents, winds, and all matters affecting their navigation; and also from Mr. Hayman, master of the *Salamander*, who has had the experience of several passages between Brisbane and Somerset.

Situated about 6 miles to the southward of the Endeavour River is the entrance of another stream, an opportunity of examining which will be afforded me on the return of the *Salamander*, and the result of which I will communicate.

3. *Exploration of Annan and Esk Rivers, near Cape York, Australia.*

By JOHN JARDINE, Esq., Police Magistrate, Somerset, Cape York.

ON the 11th November, 1865, the *Salamander* anchored off an opening in the coast formed by the entrance of two streams about midway between Monkhouse and Walker points. The afternoon of the same day was occupied by me in examining the southern stream. At the entrance it had a width of 100 fathoms, and appeared to be the main channel for upwards of 10 miles. The mangrove-flats, and passing the entrances of numerous minor branches, joining on each side, the passage became so narrow that the oars touched the bushes on either bank; I therefore returned to the entrance, when, on ascending a peaked hill of considerable height, and which I have marked as "Quartz Peak," from the large blocks of quartz which form its top, a good view was obtained of the course of the southern stream, which I have marked the Esk. The upper portion appeared to drain an open valley of considerable extent, and extending in a north-westerly direction.

The northern stream—which I should wish to name the Annan—was also distinctly seen running for a long distance to the north-eastward through a wide valley, and apparently taking its rise in the main coast range. This river, although marked in the chart "*rivulet*," is fully entitled to the greater term, while the country through which it ran presented so favourable an appearance that I determined on examining it, as far as possible, on the following day. Accordingly, a boat and crew having been kindly placed at my disposal by

Commander Yonge, R.N., accompanied by my son, I entered the river at low water, and went up with the tide.

At the entrance the river is half a mile wide, gradually lessening for 3 miles to 300 yards. In the next 2 miles it narrows to 100 yards; and for the next 6 miles has an average width of 60 yards. The shallowest water is 5 to 6 feet. The general course for 10 miles is N.E. by N., when a spur from the main range, forming the watershed between this river and the Endeavour, turns it to the north-west, in which direction the features of the country lead me to believe that it continues to its source.

As it was late in the day I turned back, after having followed the course of the river 12 miles, or in a direct line from the sea 6 miles. The character of the country on the banks of this river fully realized the expectation formed on the view of it from Quartz Peak. The soil is generally a dark red clay, with a considerable depth of light vegetable mould. The grass and herbage is good. The timber chiefly blood-wood and white box. Small alluvial flats by the river are covered with the usual vine-scrub. On the left bank, about half a mile from the river, is a watercourse with good water-holes, evidently permanent, as even in this dry season they were well filled, and contained quantities of fish. The usual water-mark was at least 6 feet above the present level. The ship was reached at dusk.

On the next day, I examined the north side of the entrance for fresh water, which was found in permanent pools at a short distance from the beach, about midway between the entrance and Monkhouse Point. The land here is light and sandy, but well grassed. The general formation is granitic, with occasionally large masses of quartz.

An examination of the entrance by the Master of the *Salamander* proved it to be intricate, accessible only by a narrow and winding channel, with from 4 to 6 feet of water at low tide. Inside the entrance, however, there is deep water, which continues for some miles up the river. Had the Annan the advantages of the Endeavour at its entrance, I should give it a preference as a site for a settlement; as it is, however, it cannot be recommended as a port.

PROCEEDINGS
OF
THE ROYAL GEOGRAPHICAL SOCIETY.

[ISSUED JULY 23RD, 1867.]

SESSION 1866-67.

Tenth Meeting, April 8th, 1867.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in
the Chair.

PRESENTATIONS.—*Rev. S. M. Mayhew; E. Story, Esq.*

ELECTIONS.—*Alexander Beazeley, Esq., C.E.; Michael Beazeley, Esq., C.E.; Colonel R. de Salis, C.B.; James Harvey, Esq.; John Schofield Mayson; John Ramsay, Esq.; Thomas Stephen Whitaker, Esq.; William Henry Wills, Esq.,* Justice of the Peace for City and County of Bristol.

ACCESSIONS TO THE LIBRARY SINCE THE LAST MEETING.—‘*Inilah Kitab, Taman-wandji namanja, Jah itu Dikompol oleh J. G. F. Riedel.*’ ‘*Inilah pintu Gerbang pengatahuwan itu oleh J. G. F. Riedel.*’ ‘*De Eedaflegging bij de Tooe-ven-Boela in de Minahasa.*’ *With Plates.* Door J. G. F. Riedel. ‘*De Uitbarsling awoeh-Taverna in 1856,*’ door J. G. F. Riedel. All presented by the Author. ‘*Mauritius, or the Isle of France; being an Account of the Island, its History, Geography, Products and Inhabitants,*’ by the Rev. F. P. Flemyng, M.A., F.R.G.S. Donor, the Author. ‘*Reliquiæ Aquitanicæ; being contributions to the Archæology and Palæontology of Perigord and the adjoining Provinces of Southern France,*’ by Edouard Lartet and Henry Christy. 4th Part. Donors, the Executors of the late Henry Christy, Esq. ‘*Die Preussische Expedition nach Ost Asien.*’ Purchased. ‘*The Bahamas, 1864,*’ by Governor Watson. Donor, the Author. ‘*Interoceanic Railroads and Canals.*’ Donor, the U.S. Navy Department. ‘*The Official Gazette of the Institution of Hydronomical and Nautical Engineers.*’ Donor, the Registrar.

ACCESSIONS TO MAP-ROOM.—Africa: Map of Angola, on 2 sheets,
VOL. XI.

published by the Portuguese Government. Presented by Commodore E. Wilmot, C.B. Five Maps, on 11 sheets, presented by Professor P. Chaix : viz., Map of the Canton of Genève, on 4 sheets, by General H. Dufour. Two maps of the Baltic provinces of Russia; viz., Courland, Livonia, and Esthonia, showing the heights and water-communication, accompanied with three sectional plans, by Dr. Karl Rathlef. Map of Arabia, showing Dr. Palgrave's route, by P. Chaix. Map of the Holy Land, with letter-press. Map showing the various explorations in Smith Sound, from that of Bylot and Baffin in 1616, to Dr. Hayes in 1861. Presented by Dr. Petermann. South America : a map showing the Argentine Railway from Rosario to Cordoba, by L. M. Laberge, C.E.

Before commencing the business of the evening, the PRESIDENT announced that the Council of the Society had drawn up the following Resolutions with regard to Dr. Livingstone :—

"The Council are of opinion that it is highly desirable that a tentative expedition or expeditions should proceed, whether from Zanzibar to the head of Lake Nyassa, or from the Zambesi to that point, with a view to ascertaining the fate of Dr. Livingstone; and that the Expedition Committee be requested to report upon the measures advisable to be adopted."

It was also resolved—

"That the President be requested to communicate this Resolution to Lord Stanley, with the expression of a hope that her Majesty's Government will see fit to adopt such measures as may appear to them most conducive to the end in view, in which not only Geographers, but the public at large, take so deep an interest."

The PRESIDENT further stated that a large number of applications had been received from persons qualified to carry out, or to assist in this expedition, and that the desire was very general to set this question completely at rest. It was due to the character of our great traveller that the Society should not remain satisfied that he had met with his end, solely on the report of men who admitted that they were runaways, and did not stand by their leader.

The PRESIDENT also announced that the Geographical Society of France had awarded their Great Medal to Sir Samuel Baker, and that it would be presented to him at a Meeting on the 12th inst., when it was hoped that any Fellows of the Society who might be in Paris would attend.

CAPTAIN SHERARD OSBORN asked permission to make one or two remarks with reference to Dr. Livingstone. He met Dr. Livingstone at Bombay, when preparing for his expedition, and had some conversation with him on the subject of his journey. The traveller showed great anxiety to obtain men and cattle fit to carry burdens, among others water-buffaloes. Livingstone said his reason for taking the water-buffalo was that he might have a beast of burden that would enable him to accomplish the journey, for his success depended upon having the means of carrying his provisions and gear with him. He was indebted to the Sultan of Zanzibar for the conveyance of the water-buffaloes to Zanzibar from Bombay. He said if these failed him he did not know upon what he could possibly count. The buffaloes were wild beasts, he believed, before he reached the Lake, by the tsetse fly, which he hoped they might escape. His next resource was to fall back upon the horses he took with him from Bombay; and they, too, had failed him. The last information we had of Livingstone came from men who had abandoned

him, and upon whom he depended in his peril. Livingstone's peril consisted in being left without the means of transport; and probably, if not sought for, we should hear of some of his small party being alive hereafter, just as we had heard within the last few days that members of Von der Decken's expedition were alive, twelvemonths after they were reported to have been slain.

THE PRESIDENT said the Geographical Society took upon themselves the initiative in the search, but hoped for the assistance of Government, whose bounden duty it was to take a deep interest in the fate of one of their own officers, for Dr. Livingstone had been appointed Her Majesty's Consul to all the independent chiefs in the interior of Africa. With regard to the supposed survivors of the Baron von der Decken's expedition, alluded to by Capt. Osborn, this news was communicated in the following despatch from H.M. Political Agent at Aden:—

“Aden, Feb. 19, 1867.

“Mahomed Humal, the interpreter at the police court, who went last spring on leave to his native country, near Berbera, has returned. He reports that he sent four messengers to Nyadhira, in the hope of obtaining good information about the men of the St. Abbs, said to be in captivity among the Gallas. One messenger had died, one was still up the country, but two had returned without being able to get any tidings about the ‘St. Abbs’ people. They had, however, heard that four Europeans, described as one Nakhoda,* and three men, were in confinement among the Droosah. It was said they had been seized from a small iron steamboat in the Waber (Juba), near a mountain pass called ‘Jub-i-dug.’ If there is any truth in this story, these will be a portion of Baron von der Decken's unfortunate expedition. I have sent again to have further inquiries made. The Mijrteyn Sultan, from whom I expected the best and most reliable information, died, I regret to say, last summer. His death stayed for the time inquiries in that direction, but I have requested his successor to cause them to be carried on.”

The following papers were then read:—

- 1.—*On part of Mesopotamia, between Sheriat-el-Beytha, on the Tigris, to Tel Ibrahim.* By Lieutenant J. B. BEWSHER, Surveyor in Mesopotamia.

THE paper consisted of extracts of the official report of Lieutenant Bewsher, and described the various objects of interest, ancient sites, and canals, examined in his portion of the Mesopotamia Survey, which was taken up by Commander Selby and himself in the autumn of 1862.

The ancient canals, as a rule, appear to have had low banks, but raised slightly above the surrounding level. They generally wind considerably, and have ruins on their banks, often lining them for miles. In some places, near large ruins, they appear to have had regularly-built sides. From them irrigants were given off and led over the country in every possible direction. The author gave further details with respect to the Abu Ghurraib, the Nahr Aeesa, the Saklawiyeh, and other of the more important of these ancient canals.

* English master.

The author also discussed the site of Kunaxa, which he believed to be near the mound now called Kuneeseh, four miles to the westward of Senadiyeh. Chesney and Ainsworth, who had been over the same ground, had not noticed the name of Kuneeseh, which was the more remarkable, as this mound seems to correspond with that called Abu Ghurraib in the map of the expedition under Chesney. Kuneeseh is the Arabic for "church;" Lieutenant Bewsher believed the name Kunaxa might be a corruption of it, and that the great battle described by Xenophon was actually fought at this spot. The mound of Kuneeseh is 17 miles from Felujah, and $51\frac{1}{2}$ miles in a direct line from Babel, the northern mound of those marking the supposed site of Babylon. This agrees pretty nearly with the 500 stadia of Plutarch, which he gives as the distance between the two places. The author maintained that there was nothing in Xenophon's account of the advance or retreat of the Greeks that would disprove the supposition. The hypothesis was further confirmed by the existence of a pebbly ridge or mound, near Kuneeseh, 13 miles long and 80 feet high, which might be the hill mentioned by Xenophon as that on which Artaxerxes' cavalry made a stand after retreating from the Greeks. The position of Sittaki was next discussed, and that of the Median wall of Xenophon. With regard to the supply of water for the great irrigating canals, which always formed so remarkable a feature of this part of Mesopotamia, the author showed that it was derived from the Euphrates only, its bed being higher than that of the Tigris, and its water consequently being easily led over the plain.

The paper will be published *in extenso* in the 'Journal,' vol. xxxvii.

THE PRESIDENT, in returning thanks to Lieutenant Bewsher, congratulated the Society on this addition to our knowledge of the Comparative Geography of Mesopotamia by an Indian officer, who had followed the admirable example of Sir Henry Rawlinson, to whom the Gold Medal of the Society was awarded when Major Rawlinson—for his paper upon Ecbatana. The devotion to these branches of research did honour to the officers of the Indian Service. Seeing Captain Selby present, who was the chief of this surveying expedition, and to whom the Society were much indebted many years ago for a valuable communication respecting the mouth of the Euphrates, and the district south of the country surveyed by Lieutenant Bewsher, he hoped to hear from him and other gentlemen some remarks upon the paper which had been read.

Captain SELBY stated that he and Lieutenant Collingwood many years ago completed a chart of Mesopotamia, in seven sheets, which he forwarded in 1862 to the Government; but they are not now to be found, and all the efforts made since that time to discover what had become of those charts had been ineffectual. With regard to the subject of the paper, he believed that in the course of his survey he discovered, at a district called Dura, the site of the golden image which Nebuchadnezzar the King set up. It consisted of a conical brick mound, about sixty feet in height, and seven feet square at the summit. He found by triangulation that it was twelve miles from the

King's palace at Babylon, and twelve miles from what he believed was the temple of Belus.

Sir HENRY RAWLINSON.—The Temple of the Seven Spheres.

Captain SELBY.—If the golden image was seven or eight feet high on the top of this mound, it would be visible at twelve miles' distance when the rays of the rising sun were falling upon it. The people who inhabited Babylon, at the sound of musical instruments, would fall down and worship the image just visible on the horizon. With regard to the Euphrates, he found that it flowed very nearly, within 150 yards, the same course that it formerly did, for its course in ancient times could be distinctly traced. All the streams had a tendency to flow to the south-east, owing to the slope of the land in that direction, and the Euphrates was no exception to the rule. Lieut. Bewsher had spoken of the wall he had discovered, and which he supposed to be the Median wall; having read what was said by Herodotus, he (Capt. Selby) could not but believe that this was part of the wall of Babylon. It was six feet wide, with bastions at intervals. The account which had been given of the cause of the loss of the water of the Euphrates was perfectly true. A channel was originally cut by a pious Mahommedan, to carry the waters of the Euphrates to the town of Moshid Ali; but, no care being taken, the stream gradually enlarged, and at last became a vast river. Four or five years ago Omar Pasha attempted to dam it, but the next year the current carried away the banks on either side of the dam, which is standing at the present day, and the waters spread over the adjacent plains. The Euphrates as a navigable river no longer exists. And there was cause for apprehension that the Tigris, like the Euphrates, would be lost in the same way, unless a more energetic government than the Turkish took measures to prevent such a catastrophe.

Sir HENRY RAWLINSON said he was very glad the labours of the gentlemen who had addressed the meeting had now been brought to the knowledge of English geographers, for such labours had been previously but little appreciated or even known. This was one of the services which the Geographical Society rendered to science, giving opportunities to gentlemen of making their knowledge available, which would otherwise be lost to the world. During a residence of twelve years in Mesopotamia he (Sir Henry) had had abundant opportunities of seeing the work of these Indian officers in connection with the survey of the country. He alluded especially to Captains Jones, Selby, and Collingwood, and Lieut. Bewsher; and he had no hesitation in saying that their labours were in the highest degree creditable, not only to themselves, but to the Indian navy, to which noble service—now, alas! abolished—they had belonged. The country to which Lieut. Bewsher's paper referred was the cradle of civilization; in it were first cultivated, contemporaneously with a similar cultivation in Egypt, the natural sciences and that study of art which afterwards spread through the world, through the instrumentality of the Greeks. Throughout Babylonia there were a number of important sites. Among the most ancient were Babylon and Kutha. He believed he was the first European who had visited the ruins of the famous city of Kutha. It was the place from whence the Babylonian colonists were transported to Samaria. Kutha was mentioned several times in the Bible, and the Jews had always called the Samaritans Kuthians, in reference to the original colonization. The ruins were now popularly called Tel-Ibrahim, that is, "the Mount of Abraham," Kutha being supposed to be the capital of Nimrod, and a tradition prevailing all through the East that Abraham was here thrown into the fire by Nimrod. This tradition seemed to have sprung from a false reading of the verse in Genesis, where it is said Abraham came out of Ur of the Chaldees. As Ur also meant fire, the passage was translated in the Chaldee Targums "came out of the fire of the Chaldees;" and as, if the patriarch came out of the fire, he must first have been thrown into it, there had been invented, in connexion

with this fire, a series of fables as to the adventures of Abraham at the court of Nimrod. Kutha, as the traditional capital of Nimrod, also furnished another Biblical illustration. Nimrod, being a great hunter, was identified in the popular superstition with the god of hunting, who was called in the old mythology Nergal, and when therefore it was said in Scripture that the men of Kutha made Nergal, it really gave an historical explanation of the myth through which the ruins at the present day bore the name of the Patriarch Abraham. He might mention that the first time he visited this place, Tel-Ibrahim, it happened to be a clear day, and he thus succeeded in taking a bearing of the great ruin at Ctesiphon, twenty-three miles in direct distance, with an ordinary theodolite. Capt. Selby had spoken of the tendency of the Euphrates to run off to the south-east, owing to the slope of the land in that direction. It was, in fact, only kept in its course by extensive dams, and this had always been the case from the remotest antiquity, every governor of the province, in ancient as well as in modern times, having been thus occupied in damming up the river so as to prevent its draining off. Alexander, indeed, lost his life from this very circumstance; for, in connexion with this work of repairing the dams, he was thrown down into the marshes, where he caught the fever of which he died. There was, he might add, a perfect network of canals between the two rivers, and the water of both was formerly consumed in irrigation. The whole country, indeed—an area of 500 miles in length and 200 in breadth—was in former times one vast expanse of cultivation: it was now a sterile desert. He had mentioned, at a former meeting of the Society, that in consequence of this change in the physical aspect of the country the very climate had altered. When the water was thrown over the face of the country there were date-groves scattered over its entire surface; those date-groves attracted the clouds, and thus there were constant rains and showers during all seasons of the year. We never read in the 'Arabian Nights,' or in any of the old Arabic authors, of complaints of great heat. On the contrary, the gardens of Bagdad appeared in the eighth and ninth centuries to have been most agreeable places, where Haroun-al-Raschid and his officers enjoyed themselves amazingly; whereas at the present day the country was almost uninhabitable from May to October, in consequence of the excessive heat and aridity. In his house at Bagdad, the thermometer had stood at 125°, and in the sun outside it had been 170°. The natural advantages of the country were great, and, with the opening up of the old canals and the construction of other works of irrigation, and with security to life and property, the country would become again extremely productive, requiring very little ploughing or manuring. It was, moreover, a very favourable country for cotton. He had been assured that recently the cultivation of cotton had been very much increased, and that some specimens from the vicinity of Busorah would compare with a very good quality of Sea-island cotton from America.

Captain FELIX JONES said he had resided in Mesopotamia for a very long period, associated with Sir Henry Rawlinson and others, and would have liked to enter upon the subject of Lieut. Bewsher's paper. The clock, however, warned him there was no time left for minute topographical details, such as the identity of the site of Kunaxa required. As to the country itself, Sir Henry had been so very lucid and complete in his description, that he had really left others little to say. Lieutenant Bewsher's portion of the survey was a most creditable performance, and deserved praise, even though we might differ from his conclusions on certain minor points.

Mr. LYNCH had only one observation to make: it was with regard to the Median wall. He thought that point was settled by Captain Lynch and Dr. Ross many years ago; he visited it himself in company with these gentlemen in 1844. It extended from the western bank of the Tigris from above Istabalat—nearly opposite Kadeseyah and the ruins of Opis on the further

bank—along the edge of the tertiary formation, towards Feluga on the Euphrates, forming, he might say, the northern boundary of the alluvial plain of that part of Mesopotamia. It was built of masses of concrete and stone; no bricks, as in lower Mesopotamia, and had a ditch and glacis; and no one who had walked along it for several miles and seen that magnificent dyke extending as far as the eye could see, could doubt that that was the Median wall. It certainly appeared so to him, and it was a point of very great interest, as fixing a position in comparative geography there; for almost the whole of the lower part of Mesopotamia was one alluvial plain, the features of which had been often changed by inundations, and sites of ancient places rendered very doubtful indeed. However, the four canals mentioned by Xenophon could still be traced with great accuracy, in their ramifications throughout the whole country, which, with the Median wall, were the landmarks for the modern geographer.

Captain JONES said he must differ from Mr. Lynch as to the Median wall. It was true Captain Lynch—than whom a better surveyor does not exist—and Dr. Ross visited that part of Mesopotamia shortly after Colonel Chesney's expedition; but they had mistaken a dam for the Median wall, not having traced it to its extremity. He (Captain Jones) afterwards visited it; and, notwithstanding the opposition made by the Arabs, he succeeded in reaching the end of it, and he could not doubt that it was not the Median wall, for reasons already fully given in the Vicinity of the Median Wall of Xenophon, and Discovery of the Site of the ancient Opis.

Mr. J. CRAWFORD believed there could be no doubt that very good cotton might be grown in Mesopotamia; but they must first get rid of the Turks, and then they must get rid of the Arabs, who were not quite so bad. If the country were well governed, and if the soil were well watered, there was no reason why Mesopotamia should not be as fertile as Lombardy, Bengal, or the valley of the Nile. At present, notwithstanding the high premium that had been put upon the cultivation of cotton by the American civil war, there had been very little grown in Mesopotamia, only a patch here and there; and, as long as the Turks were there, the production could never take place on a large scale.

2. *On the Sources and Course of the Lycus, and other Rivers in Kurdistan.*

By J. E. TAYLOR, Esq., H.M. Consul, Diarbetr.

[This communication has been printed entire in 'Additional Notices,' 'Proceedings,' vol. xi. No. 2.]

Captain JONES said Mr. Taylor's more extended paper would throw great light on that portion of Kurdistan near the sources of the Tigris. He would only add that Mr. Taylor might be depended upon for accuracy of observation and for energy in his researches.

3. *Description of Diarbetr.* By R. I. GARDEN, Esq.

MR. GARDEN visited Diarbetr in the year 1856, and the present paper gave an account of the principal buildings and ancient remains inspected by him during a stay of six weeks. It will be published in the 'Journal,' vol. xxxvii.

The PRESIDENT, in concluding the Meeting, announced the approaching departure of Mr. Edward Whympre on his self-imposed mission to explore

the interior of Greenland. Mr. Whympster was well known as one of the boldest and most successful of Alpine explorers; and the Geographical Society could not but anticipate important results from his expedition. He would start for Copenhagen on the 18th inst., sailing thence to Jacobsnaven in Greenland in one of the Royal Danish Company's steamers. He need not say that they wished him God speed and every success.

Eleventh Meeting, May 13th, 1867.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in the Chair.

PRESENTATIONS.—*A. H. Louis, Esq.; Thos. S. Whitaker, Esq.; W. Felkin, Jun., Esq.*

ELECTIONS.—*John Bridge, Esq.; Richard Brown, Esq., C.E.; Alexander A. Knox, Esq.; A. H. Louis, Esq.; D. G. Sandeman, Esq.; Frederick Smith, Esq.; Sir John Walsh, Bart., M.P.; Geo. M. Waterhouse, Esq.*

ACCESSIONS TO THE LIBRARY, APRIL 8TH TO MAY 18TH.—‘*Sulle Stelle filanti del 10 Agosto, 1866.*’ Donors, the Palermo Observatory. ‘*The Calcutta Cyclone of the 5th October, 1864,*’ by Lieut.-Col. J. E. Gastrell and H. F. Blandford, R.A. Donors, the Meteorological Committee Office, Calcutta. ‘*The Open Polar Sea: Narrative of a Voyage of Discovery towards the North Pole,*’ by Dr. I. I. Hayes. Purchased. ‘*Six Years of a Traveller’s Life in West Africa,*’ by Francisco Travassos Valdez. Donor, the Author. ‘*The Electric Telegraph: Was it invented by Professor Wheatstone?*’ 3 vols. Donor, Captain G. Arbuthnot, R.A. ‘*Paraguay; its History, People, and Government,*’ from the French of M. Quentin; 90 pages. ‘*The River Plate (South America), a Field for Emigration,*’ &c., 35 pages. ‘*Brazil as a Field for Emigration,*’ by Chas. Dunlop. Donors, Bates, Hendy & Co. ‘*Central Argentine Railway: Report of Third Meeting, 1867.*’ Donors, the Company. ‘*28th Volume of the Memoirs of the Bureau Topographique de la Guerre de Russie.*’ Donor, le Chef du Bureau. ‘*Das Nordlichste Land der Erde,*’ by Petermann, Berlin. ‘*Wrecks and Casualties: Reports for 1866.*’ Donors, the Wreck Committee of Lloyds. ‘*Die Insel Mallorca,*’ by H. H. Pagenstecher. Purchased. ‘*General Missionary Atlas, from original sources,*’ by the Rev. R. Grundemann. Donor, the Author. ‘*Exploracion oficial por la Primera vez des de el Norte de la America del Sur,*’ &c., by F. M. Y. Rojas. Purchased. ‘*Geology and Agriculture,*’ by E. St. J. Fairman. Donor, the Author. ‘*Martin Hylacomylus Waltzmüller; ses Ouvrages et ses Collaborateurs.*’ Par un Geographe Bibliophile.’

MAP ACCESSIONS SINCE THE LAST MEETING OF APRIL 8TH, 1867.— Map of Lower and Upper Canada, by J. Bouchette; presented by Dr. Mac Loughlin. Native Maps of Japan and the City of Yedo; presented by Mr. Coysh, F.R.G.S. Maps of the Inter-Oceanic Canals and Railways between the Atlantic and Pacific Oceans; presented by G. Welles, Esq., Secretary of the United States Navy. Maps of the Governments of Moscow, Nischni Novgorod, Viatka, and Vladimir; presented by W. Spottiswoode, Esq. Map of the Chinese Empire; presented by Dr. A. Petermann. Various MS. of Explorations in Vancouver Island, by R. W. Brown, Esq. 32 Sheets of Reymann's Map of Central Europe; by the Author. Map of the Tea Countries of Assam and Cachar, by Major Briggs; presented by A. K. Johnston, F.R.G.S. Ordnance Survey; 284 sheets. A view of the Village at Pitcairn's Island; discovery of the Mutineers of the *Bounty* by Capt. W. F. Beechey, in H.M.S. *Blossom*, in 1828; drawn by Admiral W. Smyth. Chart of the Arctic Regions, showing the discoveries of the *Fox*, Capt. Sir L. M'Clintock, &c.

Previous to the reading of the Paper, the PRESIDENT said he was happy to inform the meeting that, at the solicitation of the Society, as before announced, Her Majesty's Government had granted a certain sum of money towards fitting out a boat expedition in search of authentic news regarding Dr. Livingstone. It would be placed under the command of Mr. E. D. Young, who served two years under Livingstone in charge of the *Pioneer* and *Lady Nyassa* on the Shire River, and who was well acquainted with the country and the character of the people. A steel boat would be built under the direction of the Admiralty, capable of being taken to pieces, so that it might be carried by land, past the rapids of the Shire. She would be launched at the mouth of the Zambesi, with the aid of one of Her Majesty's cruisers; and, having procured a native crew, Mr. Young, and the three Englishmen he takes with him, would proceed to the north end of the Lake Nyassa; and arriving there, within twenty or thirty miles of the spot where it is said Livingstone was killed, they would ascertain whether the report of his death was a fable or not. It was not intended that this expedition should proceed through the interior in search of Livingstone, for if the traveller had entered the territory haunted by the Mavite, he would have proceeded to Lake Tanganyika, and the expedition would not be able to reach him. Their minds would, however, be set at rest, and they might hope that he would some day return to this country covered with greater glory than ever. With regard to the possibility of his having reached the far interior, Dr. Kirk had recently reported in a letter to him, that a caravan of Arab traders, coming from a village within ten miles of where Livingstone was reported to have been killed, a month or two after his supposed death, had reported to the Governor of Quiloa that they had heard nothing of it; but, on the contrary, that Livingstone had passed on into the friendly country of the Babisa tribe. This, he thought, was quite enough to satisfy them that they were right in sending out the expedition. In addition to this, he had received a letter that morning from Dr. Kirk, stating that a trader had recently arrived at Zanzibar, coming direct from Lake Tanganyika, who said that he saw and spoke with a white man on the borders of the lake. Now Tanganyika was the point to which Livingstone was directing his attention, with the view to determine whether that lake had an outflow to the north, and whether it might not be the ultimate lake-reservoir of the Nile. Dr. Kirk

said he had not spoken himself to the merchant, but had only heard the report of what he had said. If this trader had indeed met with a white man, the question was, Who was he? This report showed more than ever the propriety of the search which the Geographical Society had set on foot.

The following Paper was read :—

1. *Notes on Chinese Tartary.* By Capt. SHERARD OSBORN, R.N., C.B.

CAPTAIN OSBORN stated that he had written his memoir to accompany a carefully prepared diagram, which he now presented to the Society, of Chinese Tartary as it exists, so far as the treaties with Russia are concerned. He acknowledged the assistance he had received, in compiling the map, from the recent admirable Russian surveys of Eastern Siberia, and the map of the caravan routes in Central Asia, published by Colonel Walker, of the Trigonometrical Survey of Hindostan. Quoting from the geographical information which is contained in a publication issued in Canton some years ago, the 'Chinese Repository,' he proceeded to deal with the broad geographical features of Chinese Tartary, dividing it into the three great sections of Manchuria, Mongolia, and Ili, or, as it is sometimes erroneously called, Eastern Turkestan. Half of Manchuria, it was shown, had, by the Treaty of Tientsin in 1858, passed into Russian possession; but, owing to an almost impassable range of mountains being found to exist from the River Amur to the southern extreme, the communication between the Russian coast-settlements and Eastern Siberia was in no wise improved; but Captain Osborn hoped the day was not far distant when the Russians would come into possession of the whole of Manchuria, when, with the aid of the water communication of the Songari River and the port of Newchang, in the Gulf of Leotung, much would be done towards giving Russian Siberia that outlet to the seas of India and China which her rapidly increasing importance and commercial development justify the Russians in craving. The presence of Russian settlements so close to Peking, the lecturer argued, would act very healthily on the Chinese Government; and, so far as Great Britain is concerned, we ought, on every ground, to welcome any means of improved intercourse with Siberia, which, it must not be forgotten, now forms one of the largest and most powerful states in Asia. Passing to Mongolia, Captain Osborn then drew a picture of its physical condition, and called attention to the invasion of portions of China Proper by Mussulman hordes, flying before the pressure of Russian arms in Central Asia. He refuted the idea of the utter impracticability of the country for troops or armies, and, apart from the well known fact that in ages gone by the horsemen of this region marched west to the Danube, and south to the Tropic,

he related some incidents of a migration, on two occasions, of a host of Tartars from the Great Wall to the Volga and back, proving the journey practicable even for women and children, though a severe one. Turning then to the least known portion of Chinese Tartary,—which the lecturer dealt with under the name of Ili, north and south of the Celestial Mountains,—the peculiar basins into which it was cut up by the enclosing ranges of mountains, so that the rivers—one of them 1500 miles long—discharged into lakes instead of the ocean, was dwelt upon; its magnificent mountain scenery, its diversified climate and products, the ancient cities of Yarkand, Aksu, Khotan, and others, were touched upon, and the close approximation of the Russian and British frontiers was clearly shown, as well as the advantages likely to result to the cause of order, civilization, and Christianity in Asia, if those two great powers worked as they ought to do, earnestly and in a friendly spirit together, in establishing order and good government in the lands which, lying beyond the Himalayas, have for so many centuries been in the hands of cut-throat Mussulmen, or stupid Mongols, trained to exclusion and hatred of the foreigner by the policy of Pekin.

The PRESIDENT, in returning the thanks of the meeting to Captain Osborn for his important paper, said that, with reference to the progress of Russian research, the author had not exaggerated in stating that the Russians had thrown more light upon the geography of the northern portions of Central Asia than all other nations put together. He confessed that he admired the zeal of the Russians in carrying out geographical research. He believed there was now a feeling on the part of many who formerly thought otherwise, that there was no ground for alarm on our part that a civilized Christian nation like Russia should dominate the "cut-throat" tribes of Central Asia, and open up a freer intercourse with China by land. He thought there was no ground for jealousy on our part; on the contrary, we ought to be very glad that the Russians were making such progress in opening up new lines of communication through Central Asia; that is, so long as they did not come too far south, and approach our Indian possessions. Among the Russian geographers who had distinguished themselves in Asiatic exploration, he might enumerate Semenov, Pallas, and Boutakoff. In connection with this part of the subject, he had the pleasure to announce that the Council of the Society had that day adjudicated one of their gold medals to Admiral Boutakoff, for his discoveries in the Sea of Aral, and for opening up the Jaxartes for the first time to steamers.

Mr. HORATIO LAY, C.B. (formerly Imperial Commissioner of Customs in China), said it was in the year 1650 that the Russians first made their appearance on the Amur River. Their progress since then had been slow but sure, and they had met with great opposition on the part of the Chinese. In the year 1854, during the Crimean war, they formed, at the mouth of the Amur River, a secure port of refuge for their Pacific squadron. The river is navigable for 1800 miles. Nicolaiefsk is the chief seaport, and, with the liberality which had marked the Russian Government in this region, it had been declared a free port for twenty years to come. He (Mr. Lay) believed the advance of a strong civilized power, like Russia, in Northern and Central

Asia was certainly to be welcomed, inasmuch as the Chinese were growing weaker, and incompetent to rule the Mongol tribes. Their present hold on the value to the investiture of the chiefs with titles and honours, distributed among their followers. It was quite time that a more powerful people should come in, with the view of ruling and keeping these men in order. It was a singular circumstance that the Mongols of the North should follow the occupation of shepherds, and should lead the quiet life they did, considering the career of conquest they formerly achieved. In 1202, under Genghis Khan, they swept the country from Southern Persia as far as the north of China, and in 1215 they captured Peking. A nephew of Genghis Khan invaded Russia in 1235, captured Moscow, and ravaged Poland and Hungary. That this race of people should now be following the quiet life of shepherds was a singular change; for the Russians did not throw off the Mongol yoke until the 17th century.

Sir HENRY RAWLINSON listened to the paper with great attention and interest. It was an admirable *resumé* of the varied information which we possessed regarding Central Asia, and it had the further advantage that it presented the subject in a popular and interesting point of view. With regard to the three divisions of the country which Captain Osborn had noticed—Manchuria, Mongolia, and Turkestan—that was not only a geographical division, it was also an ethnological one. The inhabitants of these three great divisions were in reality so many great branches of the Turkish race, speaking languages which might possibly be of the same family, but which were so distinct from each other that they were not mutually intelligible. He was not well acquainted with the eastern division of this great region, and should not therefore discuss it; but with regard to the western division, he must say he objected to Captain Osborn's extension of the Russian frontier line (as exhibited on the map) considerably further south than the actual condition of things warranted. Captain Osborn told them that by the Treaty of Peking the Russians were authorized by the Emperor of China to extend their frontier as far south as Khokand. The Emperor of China might just as well have mentioned Calcutta as the limit of the Russian dominion, because he had no more authority over Khokand than he had over Calcutta. China had never possessed a shadow of power to the west of the Thian-Shan Mountains. It was only, indeed, within the last hundred years—between 1756 and 1759—that she had extended her dominion over any part of Western Turkestan. A great expedition was then sent out, to which the Chinese emperor, with that enlightenment which distinguished his race, attached three scientific European astronomers, who in the course of the march backwards and forwards, between China and the Jaxartes, determined the position of some fifty or sixty of the principal towns and stations; and until within the last twenty years, when the English on one side and the Russians on the other, had been searching the central desert both from the south and north, it was only by the aid of these Jesuits which alone enabled us to construct a map or to possess any accurate knowledge of the geography of that part of Asia. No doubt the Treaty of Peking did give the Russians very great advantages in Central Asia; but the main advantage was the right of establishing consuls in the three principal divisions of Turkestan—Chughuchek, Kuldja, and Kashgar. The Russians immediately acted upon their rights at Chughuchek and Kuldja, but they had not been able to establish a consul at Kashgar. The Mahomedan inhabitants had now risen against the Chinese, and in many places had entirely destroyed them. At Kuldja there was continual fighting for two years. The Chinese were driven out ultimately, the Russian factory was destroyed, and from that time the place had been in the hands of the Zungar native population. Captain Osborn had detailed the routes leading from China through Central Asia with great accuracy: the southern route which led direct to Khokand had, however, been

shut up for the last twenty or thirty years, owing to sand-drifts. The route which had always been of the greatest importance, and which Captain Osborn had but imperfectly noticed, was the one which connected Russia with India. That route led from Semipolatsinsk to Kuldja; from Kuldja across the great glacier pass of Muzat to Aksu; and from Aksu, when the country was pretty quiet, it followed down the Khotan River to Khotan, and thence to Leh in Little Thibet, and over the mountains to India. It was not by any means a difficult route, and, when tranquillity was restored, there was no doubt it would again become a great line of traffic. Captain Osborn had further called attention to the discovery of another and better route from Khotan, by Mr. Johnson, which he believed would lead into India without passing the great mountains of Thibet at all, by proceeding to the eastward and round the Kuen-luen chain. That line showed traces of having been a great imperial road in antiquity: it was discovered in its southern portion many years ago by Moorcroft; and, as Lord Strangford had stated at a former meeting, it was on this very road that Moore's famous poem of 'Lallah Rookh' was supposed to be recited while the party were travelling from Delhi to Khotan. With regard to the political part of the question, he (Sir Henry) was not an alarmist, but he did not go the length of Captain Osborn in actually wishing that the Russian territory should reach as far as the frontier of British India. For the sake of civilization and humanity, it might be perhaps desirable that the "cut-throat" tribes of Central Asia should be eliminated altogether from Asia. But we should remember, on the other hand, that the removal of these tribes might very seriously embarrass us. We must consider, indeed, that India is held by us as a conquered country, and inhabited by an alien race, and the same remark might also apply to the Russian possessions. If it had been merely a question of Russia and England being brought into contact in Europe, no great evil need have been anticipated; but Russian conquest and English conquest meeting each other in Asia, made a very different political conjunction. The natural consequence, indeed, would be that the people of India, in times of disquiet, would look to Russia for assistance; and those whom Russia had conquered would look to England, in the same way. There would thus be mutual recriminations, intrigues, a constant state of turmoil and warfare on the frontier, which, so far from civilizing the country, would have precisely the contrary effect. What he would prefer would be that there should remain always a small strip of intermediate neutral territory to serve as a kind of "political buffer." Across that the two nations might trade, and advance the cause of civilization in every possible way without politically interfering with each other. Entertaining, as he did, this view, he could not endorse the opinions expressed in the article in the January No. of the 'Edinburgh Review,' which was the exponent of the present policy of the Governor-General of India. Advantage, he thought, should be taken of any favourable opening for putting forward our feelers into Central Asia, not for the purpose of intrigue or hostility to Russia, but with the view of pushing our trade and advancing civilization on our side as Russia was doing on hers. Thanks to Sir Andrew Waugh and his assistants, we had surveyed the whole country from the frontier of India up to the Karakoram, which was the territorial limit of our ally the Maharajah of Cashmere. The attempt to go beyond that point was discouraged by the Government, for fear of leading to political complications. He should like, however, to see this restriction relaxed, and he thought the Geographical Society would be doing good service if it could in any way facilitate expeditions, such as that projected by Captain Stoddard and other officers, who wished to push across the Karakoram into Central Asia, and thence into Mongolia. With regard to the matter of the Russian conquest of Koff, he was delighted to think that our country, represented by the Geographical Society, had risen above those petty party considerations and national jealousies which we were sometimes supposed to labour under; and that

we could, irrespective of nationality, acknowledge the merits of a man like Admiral Boutakoff, who, during the last few years, had performed the greatest geographical feat that had been achieved in Central Asia since the days of Alexander Burnes.

Mr. TRELAWNEY SAUNDERS said there were two maps* in the Society's collection which gave much more information than the map under discussion. With regard to the changes now taking place in these regions, we ought to be prepared for the possible contingencies. Chinese Tartary had been the birthplace of warlike hordes that in former times overran Europe and Asia; and when, after years of peace under a settled government, it should again overflow with a teeming population, what would become of the surplus? They would not advance to the icy north, but would naturally turn to the south. Unless we were prepared to meet that issue, we ought not to encourage Russia to advance into Central Asia. On the other hand, without any desire to increase our own frontiers, we as a trading, industrial people, ought to encourage peaceful industry and production in the great pastoral regions of Central Asia, which were capable of producing much to an untold extent. Nothing could be more fraught with benefit than the promotion of intercourse with the local chiefs, pointing out to them that their products would always find a ready market on the Indian frontier. Nothing remained in the way of such a trade but the obstacles interposed by the Chinese Government, which he thought might be removed by a little firmness on our part. Under the Treaty of Peking we had a right to be placed on the footing of the most favoured nation, and to be allowed to establish a consul and to build a church at Kashgar, the same as the Russians claimed the right to do by treaty.

Captain SHERARD OSBORN, in the course of a brief reply, said, in making their treaty with China, the Russians decidedly considered that the Chinese had the right to give them permission to come to Khokand, or they would not have asked permission. He had merely drawn the frontier south of that place, to which Sir Henry Rawlinson had called attention, to show the extent of territory to which the Russians now had access: he did not say that they were there, only that the right to go there did exist. Adverting to the possibility of the Russian armies advancing as far as Bokhara and Khiva, about which many people were incredulous, Captain Osborn narrated the main particulars of an extraordinary migration of a horde of Calmucks 600,000 strong, in the winter of 1771, from the banks of the Volga to the banks of Lake Balkash, in the face of the greatest difficulties, and with the loss of only one-third of their number, to show, as he said, that what was possible once was possible again. To cross the deserts and passes into India was only a question of time. There were no more than 120 miles of desert; all the rest of the country was covered with Calmuck hordes who wandered about it at all seasons; and the notion we had of its impassable character was owing purely to our ignorance. He had no doubt that, when the Russians found it to their interest to advance, these wastes would become inhabited.

The PRESIDENT said he had never at any time expressed a wish that the Russians should become the conquerors of this great region. Russia had no such object; her object was trade with China; and as long as she went from west to east to trade with China, and kept up a communication which she had enjoyed long before we had any conquests in India, she was perfectly entitled to do so. He firmly hoped that the great mountain barrier and impassable tract between the two nations would be left for ages to come. The Russians had shown the greatest openness on the subject of their researches in Central Asia, and had communicated to the Royal Geographical Society copies of all maps they had published.

* Stanford's Library Map of Asia, and Stanford's Map of China and Japan.

ADDITIONAL NOTICES.

(Printed by order of Council.)

1. *A Boat Journey across the Northern End of FORMOSA, from Tam-suy, on the West, to Kee-lung, on the East; with Notices of Hoo-wei, Mangha, and Kelung.* By Dr. COLLINGWOOD, F.L.S.

TAM-SUY is situated on the north-western coast of Formosa, and possesses an excellent harbour, over the bar of which H.M.S. *Serpent*, drawing 12½ feet water, passed easily at high water. The entrance is unmistakably marked by two lofty and picturesque hills—that on the left, termed the Kwang-yin Hill, having two prominent peaks, of 1720 and 1240 feet respectively; and that on the right, the Tai-tun Hills, forming an imposing ridge, the summit is 2800 feet high. From land to land, at the entrance of the harbour, is just half a mile; but a considerable spit of sand diminishes it more than one-half. Within the harbour, however, it rapidly increases to three-quarters of a mile and even a mile in width, affording good anchorage for large vessels. Immediately on the left hand, on entering, is a small Chinese fort; and half a mile higher are the ruins of an old Dutch fort,—a square, red-brick, casemated building, once, no doubt, of great strength, and elevated 50 or 60 feet above the water's edge. The long narrow strip of land, or *Hoo-wei*, as it is more properly called, commences a little higher; and consists, for the most part, of a narrow street of shops of a poor description, paved with great cobblestones or not at all, and in which pigs of all sizes and barking dogs dispute the passage, which in some places scarcely admits of two passengers passing one another. The Vice-Consul (Mr. Gregory) resides here, as well as three or four other Europeans, engaged in mercantile affairs or employed in the Chinese customs. The consulate, however, is but a poor building for the representation of Great Britain; for the inhabitants, who are mostly coolies, and upon occasion are a turbulent set of rascals, have a *prejudice*, forsooth, against building houses more than one storey high, and no such dwelling exists in Hoo-wei.

There is a very pretentious joss-house in the town, of which the stone pillars, elaborately carved, represent, with considerable cleverness, fantastic dragons encircling the columns in high relief—workmen being yet engaged in the task. The immediate neighbourhood is hilly, having numerous scattered houses; and a large amphitheatre, just outside the town, forms an immense and well-filled burial-ground, upon which grows abundance of the rice-paper plant (*Aralia papyrifera*), which is largely exported from this neighbourhood. The soil is very fertile, consisting of a considerable depth of alluvium, in which are numerous angular and rounded blocks of stone, some of very great size.

The inhabitants of Hoo-wei (Tam-suy), as of the other towns in the route, are mostly poor and meanly clad—the males wearing usually nothing more than a pair of short drawers, or some substitute for them—some of the younger male children going entirely naked. The women and girls, however, are always decently clothed, very few of the female children being even naked to the waist. Bandaged feet are universal among them.

Rice is abundantly produced in the neighbourhood; but its exportation is forbidden by the Government, on pretence that there is not more produced than is required for home consumption; but by a roundabout method, a considerable trade is, notwithstanding, carried on, to the advantage of the Mandarins. Bullocks, goats, and poultry are difficult to obtain; but pigs are

abundant, though few who could witness their disgusting habits and foul feeding would care to eat them. Ducks also are plentiful.

An inferior Mandarin resides here, named Lim-ching-fang, but he is subordinate to the Mandarin of the Tam-suy District, of which Hoo-wei is but an inferior town—the chief town being Mangka, or Bangka.

Having obtained a *sampan*, or native boat, with three men, we placed in it provisions for two days, camera, collecting apparatus, &c., intending to proceed leisurely. The boat was a flat-bottomed one, adapted for the peculiar navigation, about 20 feet long and 6 feet wide, covered with a bamboo awning, and having a grass mat at the bottom; and, with the aid of a large mat-sail and a sea-breeze, we rapidly proceeded up the Tam-suy River. For the first 4 miles the stream is of varying width, averaging about a mile, and running in a south-easterly direction at the foot of the Kwang-yin Hills, which seen in the light of a western sun have a remarkably piled-up or cone-in-cone appearance, and at the base appear to be perforated with caverns. On the right bank a cultivated plain stretches to the foot of the Tai-tun Hills, which expand to the eastward as we proceed. At length at a village, called Kan-tow, the stream divides, the left arm continuing in a south-easterly direction through a flat country, in which rice and sugar and maize are cultivated, and a straight reach of $3\frac{1}{2}$ miles brings us to Twa-tu-teen, a large village where the stream trends to the south; and another mile and a half brings us to Mangka, the chief town of the district of Tam-suy. This is a large town, abounding in the narrow and unsavoury streets before mentioned—one side being covered over by a sort of arcade, the other side open, but by far the dirtier of the two, being chiefly occupied by pigs and children, which both swarm everywhere. Accumulations of filth lie about at the very doors of the inhabitants, and it is not unusual to see women adorned with bright and gaudy finery sitting within a foot or two of a pool of seething filth, enough to breed a pestilence. Chairs or sedans are to be had here, and in one of these I perambulated the town; but in some places the corners of the streets were so narrow, that it was with the utmost difficulty that the vehicle could turn them, and then only by a series of ingenious manœuvres. A single European merchant resides here, Mr. Mallisch of Hamburg, occupying a handsome two-storied house, the only one I have seen in those parts, it being "against joss" to raise one storey above another.

In making the journey from Tam-suy to Kelung, the other arm of the river n. by s. is followed, which does not lead by Mangka; but I have referred to this arm, because it leads to that place which I had visited previously in company with Captain Bullock, of H.M.S. *Serpent*, and Mr. Gregory, the Vice-Consul. On this occasion we paid a visit to the military Mandarin of the district, Ching-yung, with whom an appointment had been made, and who received us with official formality. His residence was situated just outside the town, and a salute of three guns greeted us as we entered the enclosure. Having seated ourselves in the audience-chamber, tea was served in cups of egg-shell china, by a number of attendants, when they had succeeded in chasing out the ragged crowd which had curiously followed us into the *sanctum*. The Mandarin was decorated with a clear blue button and peacock's feather, and appeared an intelligent and superior man of about 35 years of age. He conversed freely through the medium of Mr. Gregory, who acted as interpreter, and, after remaining some twenty minutes, we quitted the place with the same formalities as on entering, the Mandarin having first accepted Captain Bullock's invitation to visit the ship at Hoo-wei the next day, which happened to be Her Majesty's birthday, a promise which he did not fail to keep.

Mangka derives considerable importance from the fact that large junks come thus far, and one arm of the river which divides just beyond flows from San-Kop-yung, which is the district producing large quantities of camphor; and here the junks load with that important commodity derived from *Laurus cam-*

phora. But the trade is at present of little value to any one, except those to whom a monopoly is granted by the Chinese Government. The camphor Mandarin pays 40,000 dollars per annum for this privilege, and he purchases the camphor at the rate of 5 dollars per picul (of 133 lbs.), which he then sells for 27 dollars. One dollar as duty and some other expenses increase the price he has to pay, and 10 per cent. of the camphor is lost in the transit by evaporation owing to imperfect storage, for with the proverbial conservatism of their nation they will not adopt the plan of stowing it in tin boxes, by which it might all be saved. Still, however, the profits are very considerable. I believe that an enterprising young German merchant, Mr. Lessler, of Tamsuy, is about to bring the question of the legality of this monopoly to issue in a court of law, and I trust that this important trade will soon be open to competition by European merchants.

The other branch of the river in this direction is navigable for boats up a series of rapids, to the borders of the aborigines' country, as I am informed by Mr. Gregory, to whom I am indebted for much that is interesting in connexion with this subject.

Returning now to where the river first divides at Kan-tow, we follow the right-hand branch which flows n. by s. through cultivated fields, in which we occasionally meet with patches of *Boehmeria nivea*, and small groves of betel-palm (*Areca catechu*); but the characteristic tree of the banks here, as everywhere along the river, is the bamboo, whose graceful and feathery foliage gives a great charm to the scene. On the north-east side are numerous hills, of heights varying between 1000 and 1500 feet, amongst which are situated the remnants of the village of Pah-chie-nah, which is more airy and possesses an excellent market-place. Numerous ducks, which bring some couple of hundred to a feeding-ground, where they are turned loose to spend the day under the charge of a lad, who acts as duck-herd. They keep close together all day, so that they might all be covered with a blanket, and at night are conveyed in the boat back to their pens. Another feature of the route is the Chinese water-wheels for irrigating the fields, in which three or four Chinese are constantly at work, treadmill-fashion.

At sunset we moored our boat a mile beyond Pah-chie-nah, in a bend of the river and at the foot of a hill which commanded a magnificent view of the noble range of mountains running from north to south of the island, and which the setting sun lighted up gloriously. On the opposite side of the river, upon a steep rocky bank, was a house outside of which sat a family of Chinamen of a better class, the head of which, having examined us with a field-glass, made signs for us to go over and *chin-chin* with them. We accordingly did so, and, having partaken of their tea, offered them some of our own provisions, with which they appeared much interested, particularly the white bread, though the loaf-sugar seemed most generally appreciated.

We slept in the boat, the night being brilliantly fine, a strong dew falling towards sunrise, and the stillness being broken by the croaking of frogs, the chirping of cicadas, the occasional leaping of a large fish in the stream, the passage of boats up the river, and the distant creaking of a water-wheel which appeared to be in action all night long. A strong tide was flowing; but the water appeared perfectly fresh to the taste, even at the flood.

The following morning, after taking some photographic views, capturing some of the beautiful butterflies and beetles which, especially the former, abounded on the hills, we proceeded on our journey. The thermometer being at 89° in the shade, we were glad of our bamboo awning; and there being no wind and a strong ebb-tide, we made but little progress for some time, moving slowly by a very meandering course through a highly pictur-

esque country. Hills of varying height rose on either side, usually covered with vegetation, and occasionally opening and showing green paddy-fields, while in front of us an abrupt and very remarkable long stratified hill occupied a conspicuous part of the landscape, which we gradually approached till we reached the town of Lik-kow, behind which it was situated.

Lik-kow is similar in character to the other towns on the route; but the streets are wider than those of Mangka or Hoo-wei. The inhabitants, however, did not give us any notion of their being more simple or primitive on account of their comparative seclusion, but rather the reverse. A noisy crowd followed us through the streets, some members of which appeared to incline to impudence, and one man seemed by his loud talk and gestures to be attempting to incite others against us, while the general greeting of "*hwan-ha*" (foreigners) was heard no less here than everywhere else on the route.

Leaving Lik-kow we proceeded onward through similar scenery, increasing, however, in its striking character, for six miles further. A little beyond Lik-kow on the left bank, a bed of large oyster-shells, some of them 8 or 9 inches in length, arrested our attention. They are embedded in stiff blue-clay in the river's bank, and immediately over lies a thin seam of an inferior coal, which crops out beneath. The bank (which, as in most other places, was perforated with the innumerable holes of freshwater crabs), including clay, shells, and coal, is about 4 feet high above the water's edge, and the bed extends about 100 yards in length.

We arrived at the town of Chuy-teng-cha at nightfall; and here, as its name implies, the tide-way ends. As it was dark we did not land, but proceeded a little further, and passed the night in a little bay at the foot of the rapids. Numerous boats upon the beach and many in motion seemed to show that this was a busy town of some importance; and by questions put and answered, as we passed, in which we could hear from time to time the word "*hwan-ha*," we knew that they were discussing our movements and the kind of freight our boatmen had under their charge. We had no fear of them, however, for they turned out to be excellent fellows, good-tempered, willing, and obliging, and mightily amused at all our proceedings—one of them, in particular, laughing from morning till night.

On the second night, as before, we were tormented by mosquitoes, which made it difficult to obtain any rest; while the close heat of the atmosphere made us wish to divest ourselves of some of our clothing, a proceeding forbidden by the tormenting insects. Frogs and cicadas, as before, kept up a serenade all night; and a nocturnal bird sang a harsh song in some trees upon a cliff opposite. I could not get a sight of this bird, whose four notes somewhat resembled the creaking of a wheel; the last two notes being often repeated, and sometimes twice. As soon as dawn began to appear, he flew away, and I heard him no more. At the same time two or three large bats, which at first in the twilight I mistook for owls, flew home to their retreats with a loud croak.

As soon as the sun arose, a pheasant began to crow upon the fern-covered hills, and we heard and saw several during the day; but, although I landed for the purpose, I was unable to get a shot. But by far the commonest bird we met with throughout was a black bird about the size of an English ouzel, with a long forked tail and whitish rump, which made a harsh note not unlike a jay. These birds were visible everywhere along the banks, usually in pairs, seldom flying over the river, and often perched upon the topmost spray of a bamboo in a conspicuous position. I procured the nest and eggs of this bird. The nest was made of dried grass and cotton-grass, simple in form, and situated upon the bough of a tree about 15 feet from the ground; the eggs were three in number—pinkish, with sparse umber spots and blotches, particularly about the larger end. The other birds I noticed were doves of a small species, kingfishers, pied wagtails, and grey shrikes. Early in the

morning, a lark singing in the fields could scarcely be distinguished from the English skylark, and another bird's song reminded me greatly of the English song-thrush. Another thrush-like bird also was in song; but not more than half-a-dozen birds could be said to be in song at a time, when nearly thirty would be enlivening the woods and groves of England.

Having passed the end of the tide-way, the remainder of the journey was made through a series of strong rapids, up which it was necessary to drag the boat by main force. They commenced immediately from our resting-place of the previous night, and our boatmen jumped out at the bows, and passing a bamboo across them pushed one on each side, while the third pushed behind, and thus our flat-bottomed craft moved up the incline into a reach of deep water. This proceeding was repeated perhaps a score of times, the intervening reaches being bounded by very beautifully wooded hills, with precipitous rocks dipping to the water's edge about 15° to the east. Many beautiful secluded retreats were thus passed, generally, however, with signs of life near them; for it is remarkable how densely populated this side of the island appears to be—nowhere can you go without meeting Chinese in some form or other: in the quietest and most retired spots, a cottage may often be described upon close inspection. If you wish to shoot a bird among the brushwood, you will be most likely to find a group of women and children peering at you from behind; if it is on the bank, some fisherman at work, or lads wading in the mud for shell-fish, or women washing in the stream, are sure to be there, so that it is never safe to shoot, except at the upper part of the trees. Ferries were numerous, and generally at work as we passed; water-wheels were met with at every turn, generally worked by three men, or two sets of three; children leading water-buffaloes on the bank were frequently seen, and the unwieldy heads of these animals often peered at us above the water with a mingled expression of curiosity and stupidity; and even in the midst of the stream were Chinamen and boys, sometimes stark naked, but more frequently with something about the loins, dredging for shell-fish and crabs in the river—for everything is fish that comes to the Chinaman's net, and he is always at work, even in the most unpromising situations, to earn a livelihood in a mud-bank, or a sand-flat, or up to his neck in water in a river. Population teemed everywhere, and, while in England you might walk for miles without meeting an individual, we were scarcely ever out of sight of some human being in this part of Formosa. Their houses are built of mud and thatched, occasionally more substantially of brick and tiles, but usually of grass and reeds, which are arranged in tiers, and plastered over with mud and cement,—the floor, even of the better houses, of mud or earth,—the roofs, often crescentically gabled, gave the town a very characteristic appearance. In the poorer houses in villages, the pigs and fowls made themselves quite at home in the interior, and I have seen a large cesspool only partially separated from the dwelling-room. Pigs, fowls, ducks, geese, and buffaloes are the only domestic animals, if we except the dogs and cats. The cats usually of the Japanese breed, with a short broken or twisted tail, and usually tortoise-shell in colour; the dogs are usually black, seldom white, of an ugly mongrel appearance, about the size of a pointer, and bark vigorously as soon as they catch sight of a foreigner, though there is no fear of their biting, provided you carry a stick, being the most arrant cowards. Horses and asses are unknown, and humped cattle, of a small size, rare.

At length we entered a narrow gorge of rocks, which only left room for two boats to pass one another, and warned us that the aquatic part of our excursion was at an end, and in a few minutes we were in the midst of a number of boats the counterparts of our own, which completely lined a beach about 100 yards long, scarcely leaving space for the painted nose of our own craft to insinuate itself between them. Here were clustered some houses forming the village of Liang-kha, about three miles from Kelung, where the river we had

ascended abruptly terminated on the shoulder of a hill, up which we had risen by a series of rapids, another and a smaller stream branching off from the same spot, and descending the other side towards Kelung.

Having placed our gear in a chair obtained from Kelung, we proceeded on foot through a pass on the hills, meeting on the way numerous coolies transporting goods of various kinds from Kelung. Some carried heavy bundles of dressed hemp; others, barrels of dried flying-fish of a large size. A sudden turn of the road brought us in view of a splendid panorama—the valley, town, and spacious harbour of Kelung, forming altogether a fine picture. On the densely wooded knolls in the valley, tree-ferns were conspicuous; the sandstone hills on the left dipped in long stratified lines to the south-west; and outside the harbour, in which three ships, as well as numerous junks, were lying at anchor, stood an abrupt rock, 600 feet high, known as Kelung Island, and bearing a great resemblance to St. Michael's Mount. On the right was the interesting coal-region, which renders Kelung so important a port, in which good anchorage and plenty of fuel may be always readily obtained.

The town of Kelung differs in no respect from the other towns of North Formosa. It is situated at the very head of the bay which constitutes Kelung Harbour, and consequently a long way from the anchorage: for the upper part of the harbour is a mere mud-flat at low-water, with a narrow channel in the midst, scarcely deep enough for the native sampans, although small junks do go high up and ground with every tide. The harbour, however, opens out into a fine bay between two ranges of hills, measuring from Kelung town to the entrance fully two miles, and in its widest part upwards of a mile wide. The entrance measures three-eighths of a mile in width, opening to the north-west. In such a spacious harbour, with few dangers, it might be supposed that a large number of ships might safely anchor; but unfortunately the short-sightedness of the Chinese authorities permits it to deteriorate rapidly, and, what is worse, the indolence of the people is producing effects of the most fatal kind; for when ships arrive in ballast, the boatmen, instead of taking it on shore, throw it into the harbour, and thus quickly accumulate the obstructions which it should be their care to remove. I myself saw this going on, and am assured that the harbour has very materially degenerated during the last two years in consequence. The harbour of Tam-suy is undergoing the same change; and at Takan-con, although it is forbidden to ships to throw overboard their ballast, the Chinese coolies, who are hired to take it away, convey it a few yards and throw it out of their boats.

The harbour of Kelung is hollowed out of the sandstone strata which are here very thick, and inclined at an angle of about 15° . The cliffs are worn into numerous picturesque ravines on either side, which are mostly well wooded and have several villages and hamlets scattered along their bases. On the north-eastern shore are several natural caverns, some mere clefts in the rock, and others penetrating to a considerable distance—all overgrown with drooping ferns, club-mosses, and begonias. The largest has a spacious entrance and penetrates as a vaulted arch for about 50 yards. On the left-hand side, however, is a narrow cleft just large enough to admit a man; through this we crept with difficulty a distance of 70 or 80 yards, when it expanded into a moderate-sized chamber, which we illuminated with the magnesium light, but discovered no passage beyond. At the very extremity of this cavern, the walls of which were of bare sandstone and dripping with the water which was percolating plentifully through them, a number of crickets (*Acheta*) had taken up their abode; though what could be the inducement, or what they could feed upon, it would be difficult to say. Unlike the inhabitants of caves generally, they had perfectly well-developed eyes, and I could only regard them as insects which had strayed in by accident.

Palm Island, at the entrance of the harbour, produces no palm-trees, as its

name would seem to indicate; but they are represented by cycads, which have probably been mistaken for them. This island presents unmistakable indications of having risen above its former level in comparatively recent times, and similar indications in other parts of the harbour seem to show that a gradual elevation is taking place; a circumstance which renders it more necessary to preserve the integrity of the harbour from the recklessness and ignorance of the native coolies, who misuse it in the manner previously noticed. Its importance is yearly increasing as a harbour of refuge, as a port of trade, and more particularly as a coaling-station; and its present value may be judged of from the fact that the *Serpent* was one of eight European vessels at anchor there at the same time, the others being Hamburg, Bremen, Prussian, and English ships.

2.—*On the recent Peruvian Exploration of the Rivers Ucayali, Pachitea, and Palcazu.* By MESSRS. WALLACE and MAIN.*

(Communicated to Mr. BATES, Assistant-Secretary, by M. LAURENT LETOFFÉ, of Yquitos, Peru.)

PERU has signalised herself during the last fifteen years by an earnest desire to open up to navigation and commerce those rich tracts of territory lying to the east of the Andes and watered by the majestic Amazons and its tributaries. Succeeding Cabinets have vied with each other in their efforts to promote so laudable an undertaking, and not even the distraction of a civil war, followed by a desperate struggle for national independence against foreign aggression, have been sufficient to hinder the prosecution of the enterprise. In the year 1851 the Peruvian Government concluded a treaty with Brazil relative to the navigation of the river Amazons, declaring at the same time her portion of the great river and its tributaries open to the navigation of the world.

Since 1862 the navigation of Peruvian territory has been carried on by their own vessels without intermission, in conjunction with a line of steamers passing from the Brazilian frontier to Pará. In the same year (1862) arrangements were made in England for the construction of a floating dock, and the establishment of a factory, to meet the wants of increased commerce, under the direction of Mr. Daniel Clark, chief engineer and director. Since that time great progress has been made in the province of Loreto, particularly at Yquitos, where the factory is established and the floating dock being built. Instead of little more than a few Indian huts, a large and populous colony is springing up. European labour has been introduced, mechanics of good ability have been secured, and to-day the engineering predominance of Great Britain may be seen as a prime mover in civilisation on the mighty Amazons. We must not omit to notice two small steamers intended specially for the exploration of the smaller rivers that flow into it, named the *Napo* and *Putumayo*, constructed by Messrs. Samuda and Co., with engines, worked at high pressure, by J. Penn and Sons, and despatched to Pará, where they were put together.

With the intention of further perfecting communication between the Atlantic and the interior of Peru, the *Putumayo*, under the orders of Captain Vargus, was despatched from Yquitos, on the 25th of June last, to explore the rivers Ucayali and Pachitea. After having navigated the river Ucayali and entered some sixty miles into the Pachitea, two of the officers, Tavira and West, who wished to open negotiations with the Indians, went on shore, and while in the act of presenting them with beads they were cruelly

* Two Englishmen, serving as Engineers on board the Peruvian vessels.

murdered by repeated discharges of arrows. The steamer having got aground and suffered some damage, it was found necessary to return to Yquitos, where another expedition was speedily organised. This consisted of three steamers, the *Morona*, *Napo*, and *Putamayo*, under the orders of the Prefect of the Department, Don Benito Arana, whose flag was hoisted on board the *Morona*, under the command of Lieutenant Edwardo S. Raygada. For the following account of the exploration of these rivers we are indebted to one of the officers who accompanied the expedition on board the *Morona*.

"We entered the Ucayali on the morning of the 15th of November, and anchored at Cedro Isla, 27 miles from its mouth, on the same day; on the 16th we anchored at 1 p.m. at Garça Cocha, 42 miles; on the 17th we arrived at Huánico, 75 miles, and resumed our passage from thence the following day, arriving at 2.45 p.m. at Palisado, where we took in fuel and anchored for the night at Comacera Isla, 32 miles; on the 19th we reached Puiri Isla, 50 miles, where we also took in wood; on the 20th the expedition cast anchor in Punahua, 21 miles; on the 21st we arrived at Cruz-moyona, where we anchored; and on the 22nd we reached Sarayacu, where we remained until the 26th taking in provisions and wood.

"During the eight days we had been navigating the Ucayali we found the average depth of water from 6 to 12 fathoms, with a current of from 2 to 3 miles per hour, so that it is navigable for vessels of great tonnage without risk, the distance run from Nauta being 356½ miles. On the 26th we left this port, passing a large lake called Cocha Huaya, and at 3.30 we anchored, having steamed this day 54 miles without encountering the least impediment, never being in less than 6 fathoms water. On the 27th we arrived at Cachiboya, 34½ miles. This village is situated inland 18 miles from the margin of the river, and this night we felt the shocks of two slight earthquakes. We left Cachiboya at 8 a.m. on the 28th, and anchored near the island of Canario, 3 miles from the mouth of the river, where we found this and the previous day from 6 to 7 fathoms. On the 29th we arrived at the creek which leads to the village of Calleria, situated inland some 25 or 30 miles. On the 1st of December we arrived at Puja Hualpa, 33 miles; and on the 2nd, after the celebration of divine service by Padre Calvo, we got under weigh and anchored at the mouth of the Tanvayo, 26 miles, the distance run from Sarayacu up to this point being 250 miles.

"On the 3rd December, at 5 a.m., we continued our voyage, and entered the river Pachitea at 10 a.m., saluting its virgin mountains with 21 guns, casting anchor 3 miles from its junction with the Ucayali in 7 fathoms. Whilst the crews of steamers were cutting wood for fuel, the chief of the expedition, having been informed that some Indians of the Cashibo tribe were near, called Sitico, sent a boat, manned by six Conibo Indians whom we had taken on board at Sarayacu, friendly to the whites and constant enemies to the Cashibos, whom they persecute and kill at every favourable opportunity. The Prefect believed that these Cashibo Indians might be acquainted with the place inhabited by the savages who had assassinated the unfortunate officers Tavira and West, and as the sequel proved he was not deceived. When the boat returned she brought two of the above-mentioned Indians from Sitico, who offered to take us to the spot inhabited by the Cashibos Boninaguas. After cutting wood until the 6th, we continued our voyage and anchored 3 miles below Chonta Island, in order that the savages might not be alarmed by the sound of the wheels.

"December 6th, at 4 p.m., the soldiers and attacking party being formed, accompanied by the Indian guides, we were put on shore, and defiled into the woods, where the undergrowth is so thick that it requires in many places, in order to open a road, a long knife which the civilised Indians generally use. After marching until 9 p.m. we halted, and at 4 a.m. the following day, resumed the toilsome march. About the middle of the day we came to several

huts, out of which rushed a number of armed savages, who were immediately shot down, as they attacked the soldiers with their arrows on their rallying from their huts. Those who were not mortally wounded escaped into the bush, where it was impossible to follow them, although the hideous cries too plainly indicated their proximity. In one of the huts we found and took prisoners a number of children and two women, who at the expiration of the deadly conflict which ensued were taken on board the vessel in order to be sent to a convent in Callerio. Outside the huts was a raised platform, on which our unfortunate brother officers had been so cruelly sacrificed to the inhuman appetites of these fiends in human form. One of the captured women, who was raving and foaming at the mouth at the sight of her expiring husband, rushed to one corner of the hut, and bringing some human teeth connected by a small string, dashed them on the ground, saying, 'There are the teeth of the white men.'

"No time was lost in collecting the remains of the dead savages, which were placed within the huts and the latter set fire to, and when they were in full blaze the party commenced the returning march. After we had proceeded a few miles we were suddenly surprised by a flight of arrows falling in the midst of us, which was as speedily returned with a shower of balls, but on account of the denseness of the forest no very accurate aim could be taken; but this combat lasted until we arrived at the river's edge, fortunately without any of our party being mortally wounded, although some were most painfully disabled. The boats were waiting for us at the river's edge, as those on board had been warned by the firing. After all hands had embarked and put off a small distance from the shore, several bodies of savages came howling to the water's edge, shouting in their language, 'Stop until our companions arrive, and we will kill you all;' but they were speedily dispersed by several discharges of grape-shot from one of our cannon.

"On the 8th December we left our anchorage and steamed to the Pascual-ticasca Narrows. On the 9th, although finding from 2 to 4 fathoms, we encountered a terrific current, having run 42 miles since yesterday. The 10th, 11th, and 12th we remained at anchor. The 13th we continued our voyage, conquering the difficulties which we encountered at every step, owing to the channel, which was in places no more than 80 feet broad. At 6 p.m. we anchored in 2 fathoms, having steamed this day 35 miles. On the 14th we left at 10 o'clock, and after having passed the Island of Cebuya, at 6 in the evening we found ourselves in one fathom of water, where we anchored. On the 15th we started at half-past 6, and anchored two hours after. The 16th was occupied in cutting wood. On the 17th we anchored at San Fernando. On the 18th several Cashibo Indians appeared at the river-side, and in their language expressed a desire to be our friends. Taking due precautions, we presented them with some trifling articles, which appeared to please them very much. On the 19th we continued our voyage, anchoring in 5 fathoms of water. As we found an abundance of good wood we continued here until the 25th, when we proceeded on our voyage, passing two creeks called Sungaro-Yacu and Puca. We found from 2 to 3 fathoms of water, and at night we anchored in front of a creek called Samana. On the 26th we had to anchor, not finding more than a fathom and a half; but on the 27th, the river having visibly risen, we passed a creek called Llulla Rehes. At half-past 6 we entered the river Palcazu, anchoring in 4 fathoms of water, and at a short distance from its confluence with the river Piches.

"From the mouth of the Pachitea up to this point we calculated the distance to be 204 miles. The scenery of the Pachitea is beautiful. Its width is variable, with a current of about 6 knots and a strong bottom. Its forests contain many valuable productions; some very easily to be obtained. This river is inhabited by four distinct tribes of Cashibos, and as yet no traveller or merchant has dared to enter amongst them.

"By this time we had navigated as far as it was possible, with a vessel of the tonnage of the *Morona*, and were within two hours' run of the Port of Mayro, which it was our desire to reach. Not being able to proceed, the two small steamers were despatched with the Prefect and his staff, and in a few hours reached Mayro, where a communication was immediately despatched to the Government announcing the success of the expedition, the time necessary to go to Lima from Mayro being ten days, so that now a direct route exists between the Pacific and Atlantic Oceans.* It is announced in the periodicals of the Government that they intend to prosecute further the exploration of these important rivers, and are about to order to be constructed steamers expressly for their navigation at all seasons, with all the necessary accommodation for passengers and cargo.

"Having completed the expedition satisfactorily, the boats left for Yquitos, where we arrived on the 16th of February, having been absent three months and four days."

* The distance of Mayro from the mouth of the Amazons is 3623 miles, and from Lima, by road, 325 miles.—[Ed.]

PROCEEDINGS
OF
THE ROYAL GEOGRAPHICAL SOCIETY.

[ISSUED JULY 23RD, 1867.]

SESSION 1866-7.

Twelfth Meeting (ANNIVERSARY), 1 P.M., May 27th, 1867.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in
the Chair.

THE Rules for the conduct of the Anniversary and the Minutes of the last Meeting having been read, Charles White, Esq., J.P., and C. H. Bracebridge, Esq., were appointed by the President as Scrutineers of the Ballot, to follow.

The following new Fellows were elected:—J. W. Barnes, Esq.; Lieutenant J. B. Bewsher; W. Bowell, Esq.; J. Colebrook, Esq.; E. J. Fraser, Esq.; Captain Griffiths, 63rd Regiment; the Marquis de Souza Holstein, Lord-in-Waiting to the King of Portugal; Rev. F. W. Holland; Rev. J. Holding; Rev. W. V. Lloyd; Rev. J. Milner, B.A.; C. O'Leary, Esq.; Lieutenant G. Purcell, R.N.; O. St. John, Esq.; Henry Stanton, Esq.; Captain G. Tryon, R.N.; Captain G. W. Watson, R.N.; W. Rhys Williams, Esq., M.D.; G. E. Wythes, Esq.

The Report of the Council was next read by the Secretary, C. R. MARKHAM, Esq.; its adoption was proposed by the EARL OF SHEFFIELD, and seconded by B. COLVIN, Esq., and carried unanimously.

Vice-Admiral Sir GEORGE BACK then moved the following alteration in Clause 7, Chapter I. of the Regulations:—

That the words "And Fellows not applying within one year [for their copies of the Journal] shall only be able to procure such copies through application to the Council," be omitted.

Major-General Sir ANDREW S. WAUGH seconded the motion, and it was carried without a dissentient voice.

The PRESIDENT then proceeded to deliver the Royal Medals for the Encouragement of Geographical Science and Discovery. The FOUNDER'S MEDAL to Admiral ALEXIS BOUTAKOFF, for being the first to launch and navigate ships in the Sea of Aral,—an achievement which led to the establishment of steam-navigation on that sea and up the great River Jaxartes, into the heart of Turkestan; also for his subsequent successful survey of the chief mouths of the Oxus in the Khanat of Khiva. The PATRON'S MEDAL to Dr. ISAAC I. HAYES, for his memorable expedition in 1860-61 towards the open Polar Sea, wherein he attained a more northern point of land in Smith Sound ($81^{\circ} 35'$) than had been reached by any previous navigator.

Admiral Boutakoff was represented by Captain A. CROWN, of the Imperial Russian Navy; and the Hon. Mr. ADAMS, United States' Minister, received the Medal on behalf of Dr. Hayes.

After the presentation of the Medals, the PRESIDENT read his Annual Address on the progress of Geography. Admiral OMMANNEY then moved a vote of thanks to the President, with a request that he would allow it to be printed. Captain A. P. EARDLEY WILMOT, R.N., seconded the motion, which was put to the Meeting by J. CRAWFURD, Esq., Vice-President, and carried with expressions of general approbation.

Sir WALTER STIRLING, Bart., and Sir J. E. EARDLEY WILMOT, Bart., also addressed the Meeting, expressing their sense of the great services rendered by the President to the cause of Geography.

The PRESIDENT replied, stating that this was the thirteenth time that he had to return thanks on such an occasion.

The Scrutineers reported the result of the Ballot for the President and Officers of the ensuing year; and the following gentlemen were then declared elected; the names *in italics* are those of the new Councillors, and those who change office:—

PRESIDENT: Sir Roderick Impey Murchison, Bart., K.C.B., F.R.S., &c.—VICE-PRESIDENTS: Vice-Admiral Sir G. Back, D.C.L., F.R.S.; Francis Galton, Esq., M.A., F.R.S.; Major-General Sir Henry C. Rawlinson, K.C.B., M.P.; *Major-General Sir A. Scott Waugh*, F.R.S.—TRUSTEES: Lord Houghton; Sir Walter C. Trevelyan, Bart.—SECRETARIES: Clements R. Markham, Esq., F.S.A.; R. H. Major, Esq., F.S.A.—FOREIGN SECRETARY: Cyril C. Graham, Esq.—COUNCIL: *Hon. H. U. Addington*; John Arrowsmith, Esq., F.R.A.S.; Major-General G. Balfour, C.B., R.A.; Samuel W. Baker, Esq.; Thomas H.

Brooking, Esq.; *John Crawford, Esq., F.R.S.*; *Right Hon. Lord Dufferin, K.G., K.C.B.*; *Commodore A. P. Wilmot-Eardley, C.B.*; James Fergusson, Esq., F.R.S.; *A. G. Findlay, Esq.*; *Right Hon. Sir Thomas F. Fremantle, Bart.*; *W. J. Hamilton, Esq., F.R.S.*; *Captain Felix Jones (late I.N.)*; *Sir William Stirling Maxwell, Bart., M.P.*; *Herman Merivale, Esq., C.B.*; *Sir Charles Nicholson, Bart.*; *Laurence Oliphant, Esq., M.P.*; *Captain Sherard Osborn, R.N., C.B.*; *Captain George H. Richards, R.N.*; *Viscount Strangford*; *Thomas Thomson, Esq., M.D., F.R.S.*—TREASURER: *Reginald T. Cocks, Esq.*

A vote of thanks was in conclusion moved by *W. Bollaert, Esq.*, to the retiring Members of Council, the Members of Committees, the Auditors and Scrutineers. It was seconded by *J. Arthur, Esq.*, after which the PRESIDENT said he was never better supported than by the gentlemen whose names had been read as retiring from the Council at the present Anniversary. He hoped those on the new list would be equally efficient, and that in years to come the Fellows would find that the Council had done its duty as well as on former occasions.

Mr. Crawford, as a retiring Vice-President, acknowledged the vote of thanks, and expressed a hope that *Sir Roderick* would not retire from the Presidential Chair.

The resolution was carried unanimously, after which the Meeting separated.

PRESENTATION

OF THE

ROYAL AWARDS.

(At the Anniversary Meeting, May 27, 1867.)

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THE Founder's Gold Medal is awarded to Admiral ALEXIS BOUTAKOFF, for being the first to launch and navigate ships in the Sea of Aral,—an achievement which led to the establishment of steam-navigation on that sea and up the great River Jaxartes, into the heart of Turkestan; also for his subsequent successful survey of the chief mouths of the Oxus, in the Khanat of Khiva. The Patron's Gold Medal to Dr. ISAAC I. HAYES, for his memorable expedition in 1860-61 towards the open Polar Sea, wherein he attained a more northern point of land in Smith Sound ( $81^{\circ} 35'$ ) than had been reached by any previous navigator.

In presenting the Medals, the PRESIDENT first spoke as follows:—

“IN estimating the advance of geographical knowledge, it is obvious that our allies the Russians have, by their numerous active scientific researches along and beyond their distant frontiers, thrown quite a fresh light upon the physical structure and orography of Central Asia; and in my address of this day I shall dwell upon points relating to this subject which I have not touched upon at former anniversaries.

“It is now my pleasing duty to announce that our Council has selected one of these explorers, that enterprising naval officer, Admiral Alexis Boutakoff, who in the year 1852 transmitted to us a modest account of his survey of the Sea of Aral, as the recipient of our Founder's Medal. That inland sea, though unknown to the ancients, was distinctly recognised by the Arabian geographers, from the year 600, as the Sea of Kwarezm. In the middle and dark ages all knowledge of it was lost to the western world; and it was not until Russia, desirous of an accurate exploration of her Asiatic frontiers, sent, in 1825, an expedition to examine its shores,

under General de Berg, that any real acquaintance with its condition was obtained.

"It was only, however, when ships built at Orenburg were transported in pieces across the wild steppes, that Captain Alexis Boutakoff launched the first flotilla on that sea, and after two years of navigation ascertained its outlines and depth, and the nature of the large islands within it.

"On a recent occasion Admiral Boutakoff has also laid before us a sketch of his able examination of the mouths of the Oxus, where that river empties itself into this inland sea.

"Again, it is still more important to dwell upon the other great services he has rendered to his country and the civilised world, in having proved that the Jaxartes of the ancients (the Syr Daria of the Asiatics), which flows into the northern end of the Sea of Aral, is a stream which steam-vessels can navigate for upwards of 500 miles above its mouth.

"It was by this discovery that a safe line of communication between Europe and China, through Western Turkestan, was first laid open to Europe; so that whilst Britain has had and holds her own high road to India and China by the ocean, Russia, after trading overland for centuries with Western China under 'great difficulties, owing to the intervention of barbarous and hostile tribes, has at length opened out for herself a course along which, by the interposition of small protective forts, she will have a safe trade through Turkestan with the Celestial Empire.

"Admiring as I do the great progress made by Russians in advancing our knowledge of the geography of Central Asia, I have a peculiar satisfaction in knowing that our Founder's Medal has been decreed to one who is so good a type of those enlightened explorers.

Turning to the Russian officer appointed to receive the medal, the President continued:—"Though unable to be present himself, I rejoice that his place is taken on this occasion by a distinguished brother officer of the Imperial Russian Navy; and I therefore request you, Captain Crown, to convey this medal to Admiral Alexis Boutakoff, as the expression of our admiration of his deeds."

Captain CROWN thus replied:—

"MR. PRESIDENT,—I beg to return thanks to the Royal Geographical Society on behalf of Admiral Boutakoff, for the honour they have conferred on him by awarding him this Founder's Medal. Being now a member of the Imperial Russian Navy, I cannot but feel proud at having been called upon by you, Mr. President, to



perform the pleasant duty of receiving from your hands this evidence of the high appreciation of Admiral Boutakoff's labours by the Royal Geographical Society, in a region which, even at the present time, is so very little known to the scientific world. The kind approval, which Admiral Boutakoff's works have met at the hands of an Institution so widely known and esteemed in Russia, and of which you are, Sir, the honoured President, will undoubtedly be a source of mutual advantage in the cause of science, and will encourage our Russian geographers to seek a closer acquaintance with your Society, by offering their works in a version more accessible to English scientific readers than the Russian language, so that you will be better able to follow and judge of the progress of geographical researches in Russia, as carried on by your sister institution in St. Petersburg; at the head of which, as you are well aware, is His Imperial Highness the Grand Duke Constantine. I shall lose no time in forwarding to Admiral Boutakoff this Medal, and I only regret that I cannot express his thanks to the Royal Geographical Society, and to you, Sir, in so admirable a manner as he would have done himself, if he were here."

The PRESIDENT next addressed the Hon. C. F. Adams, Minister of the United States, in the following words:—

"MR. ADAMS,

Eleven years have elapsed since the Royal Geographical Society did honour to itself by awarding a Gold Medal to your highly distinguished countryman the late Dr. Kane, for his discoveries in the Polar Regions, while in charge of an expedition generously fitted out in the United States to search for Sir John Franklin; and now I rejoice to say that I have to ask you, as the Representative of the great American Republic, to receive the Medal of our Patron, Queen Victoria, which has been decerned to another of your countrymen, Dr. Hayes, for having reached a more northern point of Arctic land ( $81^{\circ} 35'$ ) than ever was attained by any previous explorer.

"Forming one of the previous expedition of the lamented Kane, who justly received the applause not only of your country but of the civilised world, Dr. Hayes was on that occasion the discoverer of a large mass of land forming the extreme western shore of Smith Sound, to which the name of Henry Grinnell, an enlightened citizen of New York, the mainspring of that expedition, was most appropriately attached. It is for carrying personal observations to a degree and a half further northward on land than on the previous occasion, and for having sighted the open Polar Sea from the western shore of Kennedy's strait, just as Kane's com-

panion Morton had done from the eastern or Greenland shore of the same, that our Council has most deservedly adjudicated to him our Patron's Medal.

"The scientific results of this expedition have been to a great extent made known in America, and the Smithsonian Institution has undertaken the publication of those important additions to our acquaintance with the natural history, terrestrial magnetism, and meteorology, as well as the geography of the Arctic Regions.

"In the meantime the unpretending volume of our Medallist, entitled the 'Open Polar Sea,' is written in so clear, manly, and attractive a style, as must render it very popular among all readers in the British Isles and America.

"Just as we know that our old Baffin first discovered and navigated in a very small craft the great bay separating Greenland from America, with which his name has ever since been connected, so the extremest point where these waters lead into what was called the 'Open Polar Sea' has been reached by the small American schooner of Dr. Hayes bearing the name of the 'United States.'

"In perusing the narrative of the hair-breadth escapes of this little vessel when beset by huge floating icebergs, the skill with which she was managed, the stern resolution and ability with which every difficulty by sea or by land was overcome, and the rich scientific fruits which were brought back, with the loss only of the able Mr. Sontag, who made most of the astronomical observations, I may well congratulate your Excellency on the success of a voyage which will ever be remembered among the many great exploits of your countrymen.

"I have now only to request you to convey this Victoria Medal to Dr. Hayes, with the request that he will accept it as the strongest proof we can offer of our just appreciation of his great merits."

Mr. ADAMS replied:—

"Mr. PRESIDENT,—It gives me great pleasure to be the medium of presenting to Dr. Hayes the honourable memorial which your Society has voted to him for his services in the cause of science. It is no part of my province to undertake to vaunt any of my countrymen; but I will say that, in no part of the world will you find more people who watch with greater attention and admiration the brave enterprises for public objects which are undertaken in any part of the world. More especially by their natural connexion, in all the essential elements of civilisation, with this community, their attention is closely drawn to every movement which takes

place here; and following the admiration with which they see what has been done, there grows a desire to emulate the same themselves. It has been often objected to enterprises of this kind, that they can lead to nothing—that they are, in their nature, simply adventures in quest of things that are impossible. But, Mr. President, the same remark might have been made when Columbus first undertook his voyage to the West—to what, he did not know. He thought he might come out somewhere in far Cathay; but the result was, as often happens in life, an unexpected one—and the unexpected turns out to be of greater proportions than anything which had been anticipated. Thus it was that America was discovered, and the influence of that discovery upon the fortunes of the world remains yet to be fully measured. And so it has been with most of the adventures that have been started from the Old World for the discovery of that which was unknown. Very often the explorers do not arrive at what was anticipated; but then they attain to a great deal which was not expected, and which has at the same time proved of very great value. And more than that, and greater than all, this pursuit has led to the cultivation and development of high moral qualities in a class of men, who become themselves greater heroes and greater benefactors to the interests of the world than most conquerors who have been lauded in the pages of history. I therefore, Mr. President, accept this Medal with great pleasure, and I have no doubt that this marked testimony to the merits of one individual will be felt not only by him, but by all that class of individuals, who, at their own cost and expense, carried on his enterprise. It will, moreover, stimulate them to repeat such efforts in emulation of your countrymen, by which the bounds of science may still further be indefinitely extended.”

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# ADDRESS

TO

## THE ROYAL GEOGRAPHICAL SOCIETY.

*Delivered at the Anniversary Meeting on the 27th May, 1867.*

BY SIR RODERICK IMPEY MURCHISON, BART., K.C.B.,

PRESIDENT.

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GENTLEMEN,

I meet you with the satisfactory announcement that great as was the number of our members at the last anniversary, it has since then considerably increased, and now amounts to 2120 Fellows.

I have also the satisfaction of reminding you that, thanks to the zealous and efficient services of our Assistant Secretary, Mr. Bates, the well-filled volume of the year has been, like the last, for some time in your hands.

The general observations on the progress of Geography which I shall lay before you in the following Address will, as usual, be preceded by brief notices of those of our deceased associates who have taken any part in geographical researches or publications, as well as by a review of the Admiralty Surveys prepared by Capt. Richards, the Hydrographer.

### OBITUARY.

In justice to an eminent geographer who has been taken from us, I begin the sad record (much less heavy, however, than that of last year), with a notice of the career of

Sir George EVEREST.—This distinguished Indian surveyor and geographer was the son of Tristram Everest, Esq., of Gwernvale, Brecon, and was born on the 4th July, 1790. He began his scientific education at Marlow and completed it at Woolwich, where he passed a brilliant examination, and was declared fit for a commission at an earlier age than the limit fixed by the regula-

tions. Sailing for Bengal as an artillery cadet in 1806, the first important service in which he was engaged was in executing a reconnaissance survey of the Island of Java, for which duty he was selected by the famous Sir Stamford Raffles, during the occupation of the island by the British from 1814 to 1816. During this period Everest gained the friendship of our honoured associate Mr. John Crawfurd, who, happily, is still amongst us, after a distinguished career in the East, particularly in connexion with the Malay Archipelago.

On his return to Bengal, Everest was employed by the Government in various engineering works, particularly in the establishment of a telegraph system between Calcutta and Benares. It was not long, however, before he entered upon a service of more immediate connexion with Geographical science; for in 1818 he was appointed chief assistant to Colonel Lambton, the founder of the Great Trigonometrical Survey of India. It will not be considered out of place here, if I mention that this colossal undertaking owes its origin to the late Duke of Wellington, who recommended it and gave it his cordial support, selecting Colonel Lambton to carry it out. How much an accurate survey was needed was shown by the earlier results of the operations, an error of 40 miles being detected in the breadth of the peninsula as previously laid down.

Captain Everest was first employed in the triangulation of the eastern part of the Nizam's dominions, where the unhealthy climate and close application to his duties so affected his health that he was ordered to the Cape of Good Hope to recruit. He did not, however, remain idle, for he employed his leisure in investigating the circumstances appertaining to the Abbé de la Caillé's arc, and his researches formed the subject of a paper, published in the first volume of the 'Transactions of the Astronomical Society.'

On the death of Colonel Lambton, in 1823, Captain Everest succeeded to the vacant post of Superintendent of the great Survey. He applied himself with such unremitting ardour to the extension of the great arc series of measurements, that his health again gave way, and he was obliged to seek rest and change for a time in England.

In 1830 he returned to India, provided, by the liberality of the Court of Directors, with an equipment of geodetical instruments and apparatus for the continuance of the survey, in the construction of which the most skilful makers had been employed. He had made himself acquainted during his visit with the English Ordnance

Survey system, and with every modern improvement in geodetical matters that had taken place in Europe. Thus provided, and in the prime of life, Colonel Everest returned to his great task. In addition to the duties of Superintendent of the Trigonometrical Survey, he had now to perform those of Surveyor-General of India, to which office he had been appointed by the Court of Directors; a union of offices which vastly increased his labours.

Between the years 1832 and 1841 the measurements of the great arc were carried on, and in December of the latter year closed by the completion of the Beder base-line, a work accomplished by his chief assistant, Captain (now Sir Andrew Scott) Waugh. The whole Indian arc from Cape Comorin to the Himalayas was thus completed. These elaborate operations were fully detailed in Colonel Everest's work on the 'Measurement of two Sections of the Meridional Arc of India,' published in two quarto volumes in 1847; a work which gained for its author a high reputation.

In summing up the labours of Sir George Everest I cannot do better than quote the expressive words used when the Asiatic Society of Bengal nominated him an Honorary Member. "Of the many works executed under Colonel Everest's direction, the most important, and that by which he will be best known to posterity, is the northern portion of the great Meridional Arc of India,  $11\frac{1}{2}^{\circ}$  in length. No geodetic measure in any part of the world surpasses, or perhaps equals, in accuracy this splendid achievement. By the light it throws on researches into the figure and dimensions of the earth, it forms one of the most valuable contributions to that branch of science which we possess, whilst, at the same time, it constitutes a foundation for the geography of Northern India, the integrity of which must for ever stand unquestioned. Colonel Everest reduced the whole system of the Great Trigonometrical Survey of India to order, and established the fixed basis on which the geography of India now rests."

After Sir George Everest's departure from India in December, 1843, and retirement from the service, his successor, Sir Andrew Scott Waugh, took an opportunity of paying a well-deserved compliment to his former commanding officer, by naming after him the highest mountain measured in the Himalayas—namely, Mount Everest, whose height is 29,002 feet.

At the conclusion of his active career in India, and on settling in England, it was quite natural that all scientific Societies should have wished to do honour to such a man. He therefore naturally became

a Fellow of the Royal Society, an active supporter of the Royal Institution, but especially was he appreciated by Geographers, inasmuch as he was for many years one of our most honoured associates in the Council of this Society, and one of the most distinguished scientific Geographers who ever held the office of Vice-President.

Professor Henry ROGERS was a distinguished Geologist of the United States, who for the last years of his life became quite naturalised among us, and was indeed Professor of Natural History in the University of Glasgow at the time of his death.

His chief work, entitled 'The Geology of Pennsylvania, with a General View of the Geology of the United States,' in 3 vols. 4to., was illustrated by so well-defined a map of the whole region of the United States, that even in this Society his name must be ever mentioned with respect.

Besides the delineation of the boundaries of all the principal geological formations in the States, his sections are most ably drawn in showing how the strata of the Apalachian chain have been folded over and over, and how the whole have been violently affected, and in many cases reversed in their order, particularly in contact with igneous and metamorphic rocks of the eastern seaboard.

The Rev. George Cecil RENOARD, Rector of Swanscombe, near Rochester, who died on the 15th February last, in his eighty-seventh year, was one of the oldest Fellows of our Society, and during ten years (1836 to 1846) acted most efficiently and zealously as Foreign Secretary. In early life, after leaving Cambridge, he fulfilled the duties of Chaplain to the British Embassy at Constantinople; and, after an interval in England, went back to Turkey as Chaplain to the Factor at Smyrna, which appointment he held to 1814. On returning to Cambridge, he was elected Professor of Arabic in that University. His acquaintance with the geography and languages of the East rendered him a most leading and useful member of the Asiatic and Geographical as also of the Syro-Egyptian and Numismatic Societies.

In regard to his incessant labours to correct and improve all the publications in our volumes which related to Comparative Geography, or to Asiatic and African subjects, I can bear full testimony that this good and learned man laboured successfully for others in the advancement of knowledge, without looking for praise or endeavouring to gain any reputation for himself. As an editor his per-

spicuity was invaluable, as shown by all the papers on classical or critical Geography which passed through his hands.

His kindly manners and true modesty endeared him to every one of the Council with whom he acted, and when he spoke on any moot point, he was as logical in his deductions as he was accurate in his facts.

An excellent parish priest, he united the utmost purity of life with a simple and guileless nature, chastened by a feeling of reverence as deep as it was real; for, disliking metaphysics, he always maintained that Faith has its own high region whither Reason cannot follow it.

Sir STUART DONALDSON, who died on the 11th of January, 1867, was brought up to commercial pursuits, his brother the late Dr. Donaldson, Head Master of the School at Bury St. Edmunds, having been one of the most accomplished scholars of our day. At an early age he went to Mexico, where he remained some years, and acquired a knowledge of the Spanish language, which he spoke with fluency. About the year 1830 he went to Australia, and was engaged at Sydney as a merchant for many years.

On the establishment of Representative Institutions in the colony he became a Member of the Legislature; in which, being a ready and successful speaker, he took a prominent place. When responsible Government was set up in the Australian Colonies (1856) he became Colonial Treasurer, and on his return to England, in 1859, he received the honour of knighthood. Among his good deeds he is to be remembered as one of the original Members of the Senate of the University of Sydney, in the foundation and conduct of which he took, as I am informed by Sir Charles Nicholson, a very important part, as well as in other colonial establishments.

When he came among us here, we who knew him became soon attached to him, for his warm, cheerful, and genial manner; whilst at our convivial parties his fluency and energy as a speaker will be always remembered. In short, both in Australia and at home, this open-hearted, generous man has left many friends to deplore his loss in the prime of life, and when he was striving to obtain a seat in the British Parliament.

It is not within my province to endeavour to do justice to the various claims which many other deceased Fellows have unquestionably had to public recognition, irrespective of geographical science and researches. A mere enumeration, however, of the names of



those who have been taken from us, many of whom were of high reputation in other spheres, will indicate how well the Royal Geographical Society is supported by men of all classes in the British dominions. In this melancholy list are the following:—The Marquis of Camden, K.G., D.C.L., one of our original members; the second Marquis of Lansdowne, son of our much lamented Founder; Lord Northbrook, well known as Sir Francis Baring, M.P., who, when First Lord of the Admiralty, was a good supporter of Arctic exploration and Lady Franklin's efforts; Mr. T. Alcock, formerly M.P.; Mr. Joseph Beldam; Mr. Charles Bathoe; Captain John Chapman, R.A.; Mr. Daniel Clark; Mr. John Dobie, R.N.; Mr. George Dollond; Mr. Peter Dickson; Sir Alexander P. Gordon-Cumming, Bart., of Altyre; Mr. J. Gilchrist; Mr. Charles Pascoe Grenfell, many years M.P.; Mr. Robert Carr Glynn; Major J. F. Napier Hewett; Mr. Jacob Herbert; the Rev. C. Hudson, the ardent Alpine explorer, who lost his life on the Matterhorn; Mr. F. S. Homfray; Mr. R. Hanbury, M.P.; Captain Clement Johnson; Commander Jones-Byrom, R.N.; General Sir Harry Jones, G.C.B., a highly-distinguished officer of Engineers, and lately Governor of the Royal Military College; Mr. C. H. C. Plowden; Mr. Thomas Phinn, Q.C., formerly M.P., and latterly Judge-Advocate of the Fleet, and Councillor of the Board of Admiralty; Major Patrick Stewart, distinguished for his engineering services under Lord Clyde in the Indian war, and also in the laying down of the great telegraphic line through Persia to Hindostan; Mr. J. F. Pike Scrivener; Mr. H. S. Dazley Smith; the Rev. W. Brownrigg Smith, M.A.; Mr. John Stewart; Mr. Alexander Trotter, the brother of the lamented explorer of the Niger; Mr. John Taylor; Mr. Thomas Vardon; Mr. C. Willieh; and the Right Hon. John Wynne.

ADMIRALTY SURVEYS.\*—The Admiralty Surveys both at home and abroad have been carried out during the past year with energy and success, and the results compare favourably with those of any preceding year. The following sketch will convey an idea as to how the force has been distributed, and the amount of work which has been accomplished.

*Coasts of the United Kingdom.*—Captain E. J. Bedford, with his three assistants in the *Lightning*, have been employed in the Bristol Channel. They have completed a new Survey of Cardiff Roads and

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\* By the Hydrographer, Captain G. H. Richards, R.N.

its approaches on a scale of four inches to the nautical mile, and have done much towards correcting the Chart of the upper portion of the Channel in the vicinity of the Welch Grounds, where great changes had been found to have taken place since the Surveys of 1847-9. This work is still in progress.

Staff-Commander E. K. Calver, with his two assistants in the *Porcupine*, has been employed in making a minute examination of the eastern coasts of the United Kingdom, with a view to correcting the charts and revising the Sailing Directions to meet the constant changes which are occurring on these shores. Five hundred and thirty miles of coast between Cape Wrath, the north-westernmost point of Scotland, and the River Humber, have been so examined, and the entrances of the rivers Tay, Blyth, Tees, and Humber, where very considerable changes were found to have taken place, have been entirely re-surveyed. During the progress of this work a dangerous sunken ledge off Tarbet Ness—the promontory which separates the Dornoch Firth from the Bay of Cromarty—has been discovered and placed on the charts.

*Channel Islands.*—Staff-Commander John Richards, with one assistant, has completed the coast-line of the Island of Jersey, and has constructed on a large scale a plan of St. Helier's Bay, to enable the island authorities to improve and extend their present limited harbour accommodation.

The exceptionally rocky nature of the shores of the Channel Islands, the many off-lying dangers, the strength of the tides, and the general intricacy of the navigation, render the progress of this important survey necessarily slow, and much remains to be done before we can supply a complete and satisfactory chart of the whole group with their approaches. Surveys of most of the islands, however, are already separately published.

*Portsmouth.*—A small party with a steam launch has been employed on the Bar, Spithead, and its neighbourhood, during the past year. The deepening of the entrance by artificial means, and the numerous works in progress, have rendered it necessary that a constant watch should be kept to detect the least changes which may possibly take place. Commander Brooker, in conjunction with Mr. Hall, Master R.N., which latter officer succeeded in August last to the charge of the survey, has made a minute examination of the Bar on a scale of 60 inches to the mile; and it is satisfactory to find that the extra depth of between 6 and 7 feet water, which was obtained by dredging two years since, is fully maintained.

*Foreign Surveys.—Mediterranean.*—The *Hydra*, under Captain Shortland, has been employed during the past season in making a new survey of the Malta Channel, which has involved a minute triangulation of the south and east coasts of Sicily, the accurate determination of the various shoals, with elaborate soundings. This work is still in progress, and it is hoped will be completed during the present year.

*China Sea.*—This Survey which is under the charge of Mr. J. W. Reed, Master R.N., in the *Rifleman*, extends from the Equator to the parallel of Hong-Kong, including the various passages southward and eastward of Singapore, together with the main and Palawan routes. The whole region is encumbered with innumerable reefs and shoals, and although very much has been done towards determining their true positions, by the many eminent Surveyors who have been for years employed by the Admiralty on this service, no less important to all maritime nations than to Great Britain, much still remains to be completed before we can consider the routes to China free from danger.

Mr. Reed and his officers have been profitably employed during the past year in examining the reefs and shoals in the main route. They have surveyed the St. Esprit Shoal, between the Paracels and Hong-Kong, the Fiery Cross or Investigator Reef off the North-west Coast of Borneo, and determined the true positions, or expunged from the Chart those of many other hitherto doubtful dangers.

*North China and Japan.*—It was stated in our last Annual Report that the *Swallow*, employed for four years on this Survey, was on her way to England, and was to be relieved by another vessel. The *Sylvia*, under Commander Brooker, has since left England on this duty. The Survey comprises a very extensive field of new, or, at any rate, little known ground, towards which trade is now rapidly advancing.

The labours of the Surveyor have always been, and always must be, the precursor of Commerce; and Japan, Formosa, the Korea—the islands of the Eastern Archipelago—will long afford scope for his energy and talent. The vast Empire of Japan, indeed, has the outline of its shores fairly represented on our Charts upon the authority of its own ingenious geographers, and its principal ports to which we are at present admitted have been surveyed by ourselves; but there is still a void which the annual record of disasters too clearly confirms, and which, if ancient custom is adhered to, it will

remain for us to fill up. As to the Korea, it is at present almost a sealed book.

The *Serpent*, a ship of war under the orders of the Commander-in-Chief in China, commanded by an able surveying officer, Commander Bullock, performs also the duties of an auxiliary surveying vessel when necessary, or the exigencies of the service will admit; and many valuable contributions to the hydrography of the China Seas have been received from Commander Bullock, more especially connected with the coasts of Japan.

*Straits of Magellan.*—It was also stated in our last report that in withdrawing the second vessel from the Mediterranean Survey now approaching completion, it was the intention of the Admiralty—considering the importance of this Strait as a line of steam communication between the Atlantic and Pacific Oceans, and the comparatively little that was known of those extensive channels leading northwards into the Gulf of Peñas from its western entrance—to undertake a thorough examination of this region. The *Nassau*, commanded by Captain Mayne, sailed accordingly from England on this service in the fall of the past year, and, from our latest information, had commenced her work under favourable circumstances and with the cheerful co-operation of the Chilian Government.

*West Indies.*—This Survey, which is carried on by hired vessels and boats, has been in abeyance during the last year, owing to the officers who had been many years employed on it having returned to England. It has, however, been resumed under its former commanding officer Mr. Parsons, Master R.N., who, with two assistants, now commence the Surveys of Barbadoes and Montserrat.

*Bermuda.*—A small surveying party under Mr. Langdon, Master R.N., has been for some time engaged in sounding the various channels between the reefs of this group, the increased draught of water of our ships rendering diving operations occasionally necessary to remove coral patches.

The *Gannet*, a ship of war on the West India Station, commanded by an experienced surveying officer, Commander Chimmo, is also engaged in surveying operations, when other duties will permit. Commander Chimmo has, during the past season, completed the survey of the Gulf of Paria and other portions of the Island of Trinidad, and made large plans of the entrance known as the “Serpent’s Mouth,” and the anchorage of San Fernando.

The *Gannet*, and gunboat *Minstrel*, under Commander Chimmo,

assisted by Mr. Scarnell, Master R.N., have completed the soundings of the Bay of Fundy, and thus brought to a close the survey of Nova Scotia.

*Newfoundland.*—This survey, under Mr. J. H. Kerr, Master R.N., and carried on in a hired vessel, has made steady progress during the last year. Mr. Kerr and his assistants also rendered essential service to the expedition which laid the Atlantic cable of 1866, by buoying the course of the cable, and by piloting and assisting with their local knowledge the squadron which assembled in Trinity Bay on that occasion.

*British Columbia.*—Mr. Pender, Master R.N., in charge of this survey, with two assistants, has been employed during the past year, with a hired vessel, in surveying the intricate and hitherto little known channels between the north end of Vancouver Island and the northern boundary of the British possessions, in  $54^{\circ} 40'$  N. lat., and has made good progress with this work; he has also surveyed the bar and harbour at the eastern entrance of the Skiddegate Channel in Queen Charlotte Island, as well as made plans of several useful anchorages, not before known, on the shore of the mainland. The bar at the entrance of the Fraser River has also been re-surveyed, in consequence of material changes which had occurred in the depth and direction of the channel.

*Cape of Good Hope.*—The survey of the shores of this Colony has rapidly advanced towards completion under Staff-Commander Stanton, during the past year; and, with the assistance of H.M.S. *Rapid*, Commander Stubbs, afforded him by Commodore Caldwell, the soundings between Storm River and Cape Recife have been satisfactorily completed.

*Colonial Surveys.—Victoria.*—Captain Cox having retired from the charge of this survey, after a long and useful service of more than thirty years in the surveying branch of the profession, has been succeeded by Commander Wilkinson, who, with his assistants during the past year, has made considerable progress in the survey of the exposed outer coast of this part of Australia—having completed from Port Phillip westward to within a league of Cape Otway. The Government of Victoria have wisely placed the Colonial steamer *Victoria* at Commander Wilkinson's disposal for this duty during the last few months, the advantage of which over the former system of working in a small sailing-vessel is apparent in the increased progress of the survey; and should it be found practicable to continue this advantage to the surveying officers, we may expect at no distant

time to have the whole seaboard of this colony completely and satisfactorily surveyed.

*New South Wales.*—Captain Sidney, in charge of this survey, has, with his two assistants, made very good progress during the past year. The coast between Sydney and Port Stephens, a distance of 86 miles, has been very carefully examined and charted. A re-survey of the harbour of Newcastle, rendered necessary by the changes in the banks and channels, has also been made, and the harbour of Port Stephens has likewise been completed.

*Queensland.*—The progress of the regular survey of the coasts of this colony has been somewhat interrupted, owing to changes among the officers; Staff-Commander Jeffery has retired from the charge of the survey, and his assistant been transferred to another colony. Mr. Bedwell, Master R.N., has succeeded to the charge, and without any assistant has completed 60 miles of the shores of Moreton Bay, and sounded over 180 square miles of ground.

Any loss of time, however, which has been sustained through the causes above named has been more than compensated for by the energy and ability of Commander Nares, of the *Salamander*, who, while employed on special service between Brisbane and the new settlement of Somerset at Cape York, has lost no opportunity of adding to our hydrographical knowledge of those parts of the Eastern coast of Australia which had only been partially examined before; and since our last report Commander Nares has surveyed the eastern coast of Hinchinbroke Island, the Palm Island Group, and Cleveland Bay.

The examination of the southern and eastern shores of the Gulf of Carpentaria by the *Salamander* was postponed during the last season, from press of other duties; but it has probably been carried out ere this.

*South Australia.*—The little vessel employed on the survey of the coast of South Australia had, as stated in our last year's report, been transferred for a very considerable time, at the request of the Colonial Government, to the north and north-western coasts of Australia in connection with the formation of new settlements. Latterly Mr. Howard, Master R.N., who was in charge, together with his assistant, Mr. Guy, have been able to add considerably to our knowledge of these shores, and have charted the coast between Cape Croker, the north-east point of Coburg Peninsula and Cape Stewart, a distance of 250 miles. All this coast has been fairly sounded and several new dangers accurately determined and laid down, as well as detailed

plans made of Mountnorris Bay and the Liverpool River. The vessel has now returned to Adelaide, and Commander Hutchison, having resumed the charge of the survey, has commenced his work on the eastern side of Spencer Gulf, 70 miles of the coast of which, southward of Cape Elizabeth, including a plan of Port Victoria, have been already completed.

*Summary.*—During the year 1866 sixty-eight new charts have been engraved and published, noteworthy among which is that showing the Agulhas Bank and the coast of the Cape of Good Hope from Hondeklip Bay to Port Natal. Upwards of 1050 original plates have been added to and corrected, and 168,900 charts printed.

Sailing Directions for the approaches to the China Sea and Singapore, by the Straits of Sunda, Banka, Gaspar, Carimata, Rhio, Varella, Durian, and Singapore, as well as the annual light books, tide tables, and azimuth tables, have been published.

CONTINENTAL PUBLICATIONS.—Independently of the Societies established in many of the capitals of Europe for the promotion of Geographical Science, the chief source of information has been, as in former years, Perthes' 'Geographische Mittheilungen,' so ably conducted by our Honorary Associate, Dr. A. Petermann. Although the past year appears not to have been remarkable for any great discoveries in our science, many memoirs of considerable interest have been published in this important serial. Amongst those more especially deserving of mention is an article entitled 'Das Nordlichste Land der Erde' (1867, Part v.), which contains a *resumé* of the geographical and cartographical results of all the North Polar Expeditions in the neighbourhood of Baffin's Bay from 1616 to the last journey of our Medallist, Dr. Hayes, in 1861. The paper is illustrated by an excellent comparative map, which gives a clear view of the successive additions to our knowledge of this portion of the Arctic regions. A memoir by the well-known Siberian explorer and naturalist M. Radde, is also well worthy of especial mention, describing the chief results of his travels and botanical researches in the Caucasus in the year 1865. This, together with a memoir by Otto Finsch, 'On the Geographical Distribution of Parrots' ('Mittheilungen,' 1867, Part i.), illustrated by a map, coloured to show the ranges of the genera and families, furnish striking examples of the close connection of botanical and zoological distribution with our favourite science. Other papers worthy of attention are, Payer's 'Investigation of the Ortler Alps,' Colonel E. von Sydow's

View of European Cartography in 1865 and 1866; an article by the learned Editor, advocating warmly the establishment of a German Society for the promotion of geographical expeditions; and, lastly, 'Altitude measurements of the Rocky Mountains in Colorado Territory,' in which it is shown that Pike's Peak and other culminating points are exceeded in height by peaks in the Sierra Nevada range of California, as measured by the Geological Survey of that State.

*Grundemann's Missionary Atlas.*—A special Atlas devoted to the illustration of the Geography of Protestant Missions, and compiled by Dr. Grundemann, is now in course of publication, in German and English editions. The first parts, containing maps of several districts on the West Coast of Africa, have already appeared, and the work seems likely to prove very useful to all those who are interested in the progress of missions in little-known parts of the world, especially as the maps contain much detail and are in a convenient and portable form.

AFRICA.—*Dr. Livingstone.*—During the last few months our thoughts have been directed, with painful interest, to the last enterprise of our eminent associate, Livingstone. For reasons which I have explained at our evening meetings, and also through the public press, I have never admitted that there existed any valid proof whatever of the death of that great traveller. And now that Arab traders have arrived from a spot close to the reported scene of the murder, long after the event was said to have taken place, and brought to the Sultan of Zanzibar the intelligence that he had passed safely into the friendly Babisa country to the westward, and that a report has arrived at Zanzibar that a white man had reached the Lake Tanganyika, we have fresh grounds for hoping that he may now be pursuing his journey in the interior. In truth, we have recently obtained good evidence of the mendacity of the man Moosa, on whose statement alone the death was reported—it being known that he has given one version of it to the Consul and Dr. Kirk at Zanzibar, and also to the British resident at Johanna, and an entirely different one to the Sepoy examined, on his return to Bombay, by Colonel Rigby. We have, therefore, the strongest grounds for disbelieving the story altogether, and for hoping that our great traveller has passed safely through the intermediate country and reached the Lake Tanganyika, the great object of his mission.

Already Livingstone, by crossing the northern end of his own



Lake Nyassa, has determined one important point in respect to the watershed of South Africa, for he has proved, according to Dr. Kirk, that this great sheet of water here terminates, and is not connected with the more northerly Lake Tanganyika. If he has been spared, as we all hope, he has before him as grand a career as was ever laid out before an African explorer, it being now probable that Tanganyika, a fresh-water sea which must have an outlet, is connected on the north with the Albert Nyanza of Baker and others belong to the Nile system. For although Burton and Speke estimated the height of Lake Tanganyika to be little more than 1800 feet above the sea—the Albert, or lower lake being, according to Baker, 2720 feet—many persons, mistrusting the results obtained by the use of a bad thermometer, still think it probable that the Tanganyika may communicate through a gorge in the mountains at its northern end with the Albert Nyanza of Baker; for both these waters lie in the same meridian.

Pursuing this subject, our associate Mr. Findlay, after a comparison of the altitude observations of Burton and Speke, on the first East African expedition, those of Speke and Grant on the second, and of Baker on his great journey to the Albert Nyanza, has prepared a memoir in which he endeavours to prove that these various altitudes are not inconsistent with Tanganyika being the furthestmost lake of the Nile system, with an exit into Albert Nyanza. This important argumentative memoir will be read to us at our first meeting after the Anniversary.

For myself, I give no opinion on a question which, like many others respecting African geography, can really be decided by positive survey only. Let us, then, trust that Livingstone has been enabled to solve this singularly interesting problem.

In the mean time, not believing in the death of Livingstone on the sole testimony of one of his cowardly baggage-bearers who fled, and who has already given different versions of the catastrophe, I am sure the Society and the public will approve of the course I recommended, and in which I was cordially supported by the Council, and, to their great credit, by Her Majesty's Government, namely, to send out a boat expedition to the head of Lake Nyassa, and thus ascertain the truth. If by this exhaustive search we ascertain that, sceptical as we are, the noble fellow did fall at that spot where the Johanna man said he was killed, why then, alas! at our next anniversary, it will be the sad duty of your President, in mourning for his loss, to dwell upon the wondrous

achievements of his life. If, on the contrary, we should learn from our own envoys, and not merely from Arab traders, that he has passed on into the interior (and this we shall ascertain in six or seven months), why then, trusting to the skill and indomitable pluck of Livingstone, we may feel assured that, among friendly Negro tribes, who know that he is their steadfast friend, he may still realize one of the grandest geographical triumphs of our era, the connexion of the great Tanganyika with the waters of the Nile system.

But even here I would have my countrymen who are accustomed to obtain rapid intelligence of distant travellers not to despair if they should be a year or more without any news of our undaunted friend. For, if he be alive, they must recollect that he has with him a small band only of faithful negroes, no one of whom could be spared to traverse the wide regions between Lake Tanganyika and the coast. Until he himself reappears—and how long was he unheard of in his first great traverse of Southern Africa!—we have, therefore, little chance of knowing the true result of his mission. But if, as I fervently pray, he should return to us, with what open arms will the country receive him! and how rejoiced will your President be, if he lives, to preside over as grand a Livingstone festival as he did when this noble and lion-hearted traveller was about to depart on his second great expedition.

The party which I have announced as about to proceed to Eastern Africa, to procure accurate information concerning Livingstone, will be commanded by Mr. E. D. Young, who did excellent service in the former Zambesi expedition, in the management of the *Lady Nyassa* river-boat. With him will be associated Mr. Henry Faulkner, a young volunteer of great promise, and two acclimatised men, one a mechanic and the other a seaman. The expedition, I am happy to say, is warmly supported by Her Majesty's Government, and the building of the boat is rapidly progressing under the orders of the Board of Admiralty. The boat will be a sailing one, made of steel, and built in pieces, no one of which will weigh more than 50 lbs., so that the portage of the whole by natives past the cataracts of the Shiré will be much facilitated. The Government have arranged for the transport of the party to the Cape, with the boat and stores, by the African mail-steamer on the 9th of next month.\*

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\* To the credit of the Union Steam Packet Company the boat has been taken out free of charge. Whilst these pages are passing through the press, I learn that the party sailed from Plymouth on the 11th instant.—*June 12, 1867.*

Arrived there, one of our cruisers will take them to the Luabo mouth of the Zambesi, where the boat will be put together, and the party—having engaged a crew of negroes—will be left to pursue their noble and adventurous errand, by the Zambesi and the Shiré, to the head of the Lake Nyassa. On account of the heavy seas which prevail on the western or leeward side of that lake, the expedition will keep close to its eastward shore, hitherto unexplored, and it is expected it will reach Kampunda, at the northern extremity, by the end of October, and there ascertain whether our great traveller has perished as reported, or has passed forward in safety through Cazembe to the Lake Tanganyika.

*Senegal.*—In former Addresses I have had occasion to record the great services rendered to Geography by the enlightened Governor of the French possessions on the Senegal, Colonel Faidherbe, who has greatly extended our knowledge of the country along the banks of that river. The most advanced post of the French is Medine, near the cataracts of Felou, 600 miles from the mouth, up to which point the river is navigable, during the rainy months, for vessels drawing 12 feet of water. With a view to ascertaining the political condition of the countries beyond the eastern frontier, as also to fix accurately the geographical positions of places between the Upper Senegal and the Niger, an expedition was sent out by Colonel Faidherbe, in 1863, to traverse the distance between Medine and the important town of Segou, which had been visited by our own renowned traveller Mungo Park, sixty years previously. The mission was most ably and successfully carried out by Lieutenant E. Mage and Dr. Quintin of the French navy. Countries recently desolated by semi-religious wars carried on by Mussulman chiefs were traversed with great danger, and the positions of the route carefully laid down; the road taken being a *détour* to the north, after crossing the Senegal, by Diangounté, to Yamina, on the Niger, and thence by canoe to Segou. By this journey Lieutenant Mage has filled up a void in all maps of the region of the Upper Senegal, and corrected the positions of many places as previously laid down by Mungo Park and others; but the accuracy of our English traveller in the most important points is cheerfully acknowledged by his accomplished French successor, especially, for instance, in the position of Yamina, which Mungo Park fixed at  $13^{\circ} 15'$ , and Lieutenant Mage found to be  $13^{\circ} 17'$  N. lat. The expedition returned to the mouth of the Senegal in June, 1866, and the

French Geographical Society in the present year has rewarded the courageous leader with one of its gold medals.

ASIA.—Whilst, with the exception of the probable settlement of the north end of Lake Nyassa by the last journey of Livingstone, little has been added in the past year to our stock of knowledge respecting Africa, much information has in the same period been elicited regarding the geography of Central Asia, particularly as respects the physical features of those vast northern portions of it which have been explored by the Russians, and the positions of places and mountain ranges laid down by our own surveyors to the north of British India.

At the head of the labours which have elucidated the comparative geography of this quarter of the globe, I place the two remarkable volumes produced by our distinguished associate Colonel Henry Yule, C.B., entitled 'Cathay and the Way Thither,' published by our active auxiliaries the members of the Hakluyt Society, and of whose productions our Secretary Mr. Clements Markham is the perspicuous editor. Although the student of the former condition of China and the surrounding regions has ever dwelt with profit and delight on the descriptions of the great traveller Marco Polo, as first brought under the notice of modern English readers by Marsden, and as since rendered so popular by the excellent work of M. Pauthier, it was left for Colonel Yule vastly to extend our acquaintance with the amount of information possessed by our ancestors in the mediæval centuries which succeeded to the epoch when the great Venetian lived. By gathering together in one collection various records of other travellers in the East, commencing with those of the quaint and original Friar Odoric of Pordenone, in the fourteenth century, Colonel Yule has not only satisfied the cravings of scholars, but has at the same time gratified geographers by the preparation of a most instructive map of Asia, such as it was when explored by those earlier travellers, and when it was ruled over by the different branches of the family of Chinghiz Khan.

The contrast between the statistical and political condition of Asia, particularly its central portion, in those days when mercantile men traversed it freely from Azof or from Tabriz to India and China, and the present time, when there exists so small an amount of land intercourse with Europe, is truly astonishing. In those days, and even as late as the sixteenth century, Samarkand, a city renowned as a

seat of Mohammedan learning, was frequented by embassies, including one from the King of Spain. Even our own Queen Elizabeth was so anxious in the first year of her reign to open out an intercourse by way of the Caspian with Persia and India, that she addressed a letter to "the Great Sophi, Emperor of the Medes and Parthians." It was then (1558) that Jenkinson, our English traveller, made the journey from Astrachan to Bokhara, passing by Urghendj.

Now, with the exception of Russia, whose mission in 1841 has been noticed in previous addresses, no European power has had any sort of intercourse with the truculent Emir of Bokhara, to whom much of this fine region is, alas! subjected. It has since been left to stray travellers, one of the last of whom is the enterprising Hungarian Vámbéry, to explain to the civilized world the real state of this region, once so important, and now so fallen through tyranny and misgovernment. No one can have read that author's sketch of the condition of the natives in either of the Khannats of Khiva or Bokhara without rejoicing that Russia has, through the energy of her Government, at last brought these barbarians to respect the frontiers of an empire which has established a safe line of communication between its own territories and those of China.

One of the most important statistical results of modern geographical research, and the employment of natural means to a great end, is the bringing into real use, for the first time in history, the River Jaxartes of the ancients (now called the Syr Daria), and navigating it with steamers from its mouth on the Sea of Aral for many hundred miles into Turkistan and Kokand. By this great feat, and by the erection of forts, Russia has established an entirely new and well-protected route between Europe and China, far to the north of that followed by travellers and merchants in the middle ages, which was from the south end of the Caspian.

England, holding as she does so high a maritime position among the nations, may reflect with satisfaction on her great eastern traffic with India and China, carried on by her own great road, the ocean; and, far from envying the recent opening out of this land and river route through Central Asia, she may be well pleased that her Northern allies should have a beneficial commercial traffic by caravans with those fertile regions of north-western China, with which, in fact, we never have had any intercourse, but with whom the Russians have traded for ages, though always until now with more or less impediment, due to the forays of the intermediate wild people, and particularly the Kokandians. The two great empires

of Russia and China seem, in fact, to be destined by nature to interchange commodities by land and river communications through Central Asia; and so long as the line of such commerce between them is separated, as it now is, from British India and its dependencies by mountainous, sterile, and snowy regions, impassable by modern armies, there never can be the smallest ground of jealousy on the part of Britain.

On this head I was much gratified, at our very last meeting, in listening to the able memoir of Captain. Sherard Osborn on the actual state of Chinese Tartary, an enormous region that has become, through the relaxation of the Chinese hold, "no man's land," and in hearing from the eloquent author, as well as from the commentators on his Memoir, that, instead of any apprehension being entertained regarding the late Russian advances, it was generally felt that it would be greatly to the advantage of the natives, as well as to British power in India, that the influence of a civilized Christian nation should be extended eastward over a region now becoming desolate through misgovernment and lawlessness.\*

These considerations lead me naturally to say a few words upon the geographical operations of our medallist Admiral Boutakoff, which have mainly led to the establishment of the new Russian line of eastern traffic, and which have justly obtained for him a high reputation. The first of these enterprises might almost be called the geographical discovery of the Aral Sea. For, although this great mass of salt water had been known to Arabian geographers during several centuries under the name of the Sea of Khwarezm, though its shores had been visited by travellers, one of whom was the accomplished Russian geographer George von Meyendorf, who described the mouths of the Syr Daria or Jaxartes, at its north-eastern extremity, and another, General Berg,† who led a Russian expedition along its western banks in the winter of 1825-6, no ship had ever sailed upon this inland sea. The first vessel launched upon it was constructed at Orenburg in 1848, and transported in pieces across the desert, and in it Boutakoff, after two years of navigation,

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\* The reader who wishes to become acquainted with the physical features and boundaries of the districts of Chinese Tartary, so well expounded by Capt. Sherard Osborn, and of which he prepared a large map, must consult Keith Johnston's Library Map of Asia, published by Mr. Stanford, in the preparation of which Mr. Trelawney Saunders took a leading part.

† See the first published notice of the remarkable expedition of General Berg in 1825, in the work of myself and coadjutors, 'Russia and the Ural Mountains,' vol. i. p. 310. General Berg is now Count de Berg, and the Emperor's representative in Russian Poland.

defined the real shape of the coast, established the depths of the sea, and was the discoverer of the large island in it, the wild antelopes of which came to stare with astonishment, yet without fear, at their first invaders.

Fifteen years have elapsed since I communicated the first important paper of Boutakoff to this Society, and it was spoken of with all the praise it merited in my Anniversary Address of the year 1853.\* The successful exploration of the Jaxartes, and the discovery of its fitness for steam navigation, which was the next exploit of Boutakoff, led to the establishment of the great central route to China already mentioned, and Russia naturally availed herself of the commercial advantages thus presented in these natural features near the boundaries of her Asiatic possessions.

The question now arises, whether, by these enterprises, the honour does not truly belong to Russia of having, for the first time in history, defined the course of the Syr Daria and its exit into the Sea of Aral? The classical writers were, as I shall presently show, ignorant of the true geography of this region, particularly of its northern part, and an attentive consideration of its geological structure and physical outlines has led me, followed by the inquiries I have made among comparative geographers who have well studied the subject, to believe that their silence with respect to the Aral Sea is no proof that it has not existed during the whole of the historical era.

Holding this opinion, I necessarily differ from my friend Sir H. Rawlinson, who, in observations recently delivered from the chair of this Society † made a very ingenious statement, and gave it as his opinion that there was sufficient evidence to show that in early times, say from 600 years before the Christian era to 500 or 600 years after it, both the river Oxus and Jaxartes flowed into the Caspian, the Aral being non-existent. That afterwards, and up to the year 1300, they fell into the Aral, and that for the next two hundred years (1300 to 1500) they came back into the Caspian, subsequently flowing gradually back into the Aral and forming the Sea as we now know it.

Although I know that my colleague will admit that my geological data must have some weight, I have to claim his indulgence for venturing to question the views of so eminent a scholar respect-

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\* Journal Royal Geographical Society, vol. xxiii., President's Address, p. lxxxvi.

† See 'Proceedings,' Royal Geographical Society, 11th March, 1867.

ing the changes of physical features in this region that may have happened in the days of history. Supported, however, as I am by the opinions of men on whose knowledge I place great reliance, I must say that I cannot regard the Persian manuscript, which was presented to Sir Henry by a clever chief of Herat, to be a document of sufficient value to override the conclusions at which I have arrived on many independent grounds.

Concerning the ancient course of the Oxus, I see no reason to differ from the Persian writer and Sir Henry. But when it is stated that in the year A.D. 1417 the Jaxartes had deviated from its former course, and instead of flowing into the Caspian (as the ancients had it), joined the Oxus, and thus, the two rivers occupying one and the same bed, came into that sea, I must withhold my assent. This is a novel and striking statement, and before we attach credence to it we must have some physical evidence to sustain it. In my state of scepticism regarding the value of this Persian manuscript, now for the first time produced, that which strikes me *à priori* as a sign of its invalidity, is, that when this region was open to knowledge through the long-enduring reign of the civilised and literary Arabians (say from the 7th to the 13th century), the Aral was known and laid down as a distinct water-basin under the name of Sea of Khwarezm. On the other hand, when after that period knowledge became dim and local, and civilisation was at its lowest ebb, then it was that the Aral disappeared. My conclusion from this coincidence of the supposed emptying of the Aral, with the absence of records respecting it, would be that the sea had existed during all that time, but that there were then no geographers to record the fact.

In treating this subject, let us first consider the separation of the Aral from the Caspian as originally dependent on geological changes of the surface, and then proceed to estimate the value we are to attach to the writings of the classical authorities in reference to a region so very imperfectly known to them. As a geologist who has studied this Aralo-Caspian question *in situ* I beg to place on record in our Geographical volumes my view of the pre-historic physical outlines of a region which, with the exception of the obliteration of one mouth of the Oxus, has, I venture to think, undergone no essential change during the human period.

According to all good authorities, including Humboldt, there existed in the latest tertiary, or what some call quaternary times, a vast depression on the surface of the globe, extending over 8,000



square marine leagues, in which a great inland sea was accumulated, and which, in a work on Russia, my associates and myself first mapped out under Humboldt's name of Aralo-Caspian.\* In that sea there lived an abundance of molluscos and other animals, all of species having a local and limited range, and all strikingly distinguished from the more numerous animals of oceanic seas. Now, owing to the upheaval of large portions of the bottom of that old inland sea, its animal contents formed, in a fossil state, the Steppe limestone, as seen at different levels over an enormous area. Owing to these pre-historic movements of the crust of the earth, these fossil remains are seen to occupy the strata on the banks of the lake of Aral, as well as on the shores of the Caspian Sea. They also occur at various places and at different heights in the adjacent Steppes, extending westward to the country of the Don Cossacks to the north of the Sea of Azof, where I have myself examined them. There is therefore no doubt that, in prehistoric times, the Aral and the Caspian, and also portions of a much wider region, now raised above them, were occupied by one vast internal and depressed sea, large portions of which have been desiccated. By these movements of elevation that part of the former great sea which became the Aral was elevated to about 117 ft. above the former western part, or present Caspian, and the seas thus insulated were separated through the same movements by the elevated plateau now called Ust-Urt.

This was the physical condition of the region long before tradition or history. Humboldt has well remarked that the great Aralo-Caspian depression had a similar origin to the much deeper cavity in the earth's surface occupied by the Dead Sea, though the one is only 83 feet and the other nearly 1300 feet beneath the Ocean. Now, if we endeavour to account theoretically for the low present level of the old Aralo-Caspian Sea by evaporation only, we are met by the facts that large portions of its former bottom have been raised to different altitudes in the surrounding region, and that the levels of the Sea of Aral and the Caspian are also different, and are separated by the great plateau of Ust-Urt. As it is impossible to explain the existence of the much deeper cavity of the Dead Sea except by a greater sinking of the earth's crust, so is such a phenomenon precisely what geologists would expect to see realized

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\* See 'Russia in Europe and the Ural Mountains,' vol. i. pp. 303-314, and particularly observe the map and section, p. 311, from the Sea of Azof across the Caspian and the Ust-Urt to the Sea of Aral.

as a natural and compensating result of the corresponding upheaval of the adjacent lofty mountains of Asia.

This being the conclusion at which geologists have arrived, let us see if it be interfered with by any reliable historical records. As to the knowledge possessed by Alexander, or his cotemporaries, it really does not touch the question of the relative courses of the Oxus and Jaxartes towards their mouths. For Alexander crossed the Oxus at about 400 miles above its mouth, and the most western point at which the great conqueror reached the Jaxartes was Cyropolis, where he passed it to defeat the Scythians; and that spot is about equidistant from the Aral Sea. Consequently, neither Alexander nor his generals could know anything of the real course of either river for great distances above their mouths. Scholars and comparative geographers doubt, indeed, if any weight can be attached to the unanimous statement of the Greeks, that both the Oxus and Jaxartes flowed into the Caspian, by mouths some 300 miles apart,\* when they see how equally unanimous were the writers who came between Herodotus and Ptolemy in believing the Caspian to be but a gulf of the Northern Ocean! Again, we see how persistently the followers of Alexander confounded the Jaxartes itself with the Tanais, and fancied that they had doubled back upon the rear of Europe.

"The expedition of Alexander," says Humboldt, "far from extending or rectifying the geography of the Caspian Sea, confounded the Tanais with the Jaxartes, and the Caucasus with the Paropamisus or Hindu Kush."† Again, "It is through a singular combination of circumstances that the great Macedonian expedition, which in other respects extended the geographical horizon of the Western nations, became fatal to the geography of the Caspian Sea."‡ Further on, he says, "Some traces of the Sea of Aral, described as a great basin to the east of the Ural or Jaik River, are indeed found in Menander, the Byzantine historiographer; but it is only with the series of Arabian geographers, at the head of whom, in the tenth century, we must place El-Istachry, that we first obtain a certain knowledge of the topography of these countries."§

The truth is, that, when it was thus loosely said, that both the Oxus and Jaxartes flowed into the Caspian, we must make due allowance for the ignorance of the ancients of the northern portion

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\* 2400 stadia according to Eratosthenes, and 80 parasangs according to Patroclus, both quoted by Strabo.

† 'Asie Centrale,' vol. ii. p. 14.

‡ Ibid., p. 153.

§ Ibid., p. 156.

of this vast region, particularly of the course of the Jaxartes, which no one of them had fully explored, and at the mouth of which none of them had arrived.

If, indeed, we rely on the sagacious Rennell, he, in his great work on the 'Geographical System of Herodotus,' may be said to have established this point, for, in speaking of the old geographers, he says, "they understood the *Aral to be included in the Caspian*, since they knew but of one expanse of water in that quarter; for the Cyrus and Araxes, Oxus and Jaxartes, were all supposed to fall into the same sea." This he contrasts with the accurate subsequent knowledge of the Arabian geographers. And truly so, for this was the regular progress of observation, and a great advance over the ignorance of the classical writers respecting these hyperborean tracts. In those times the regions inhabited by the Massagetæ and the King of Kharasmia (the present Khiva) were barbarous countries, never explored by geographers; and, consequently, the classical authorities could only have obtained the little knowledge they possessed from native hearsay.

In his able essay on the 'Life of Alexander the Great,' Williams distinctly lays down, in his map of that period, the seas of the Aral and Caspian as distinct bodies of water. The same separation is given by Rennell, in his map of the twenty satrapies of Darius Hystaspes; and, whilst in it he indicates the Oxus flowing into the Caspian, and the Jaxartes into the Aral, he shows completely how the two seas were separated by what he terms the high plateau of Samob, the Ust-Urt of the present day.

Again, Thirlwall, in his 'History of Greece,' plainly leads us to believe that the Greeks could have known nothing of the region of the Sea of Aral and the mouth of the Jaxartes, except what they derived from the reports of the King of Kharasmia, who came from a distance in the north to visit Alexander. In short, there is no historical evidence whatever to oppose the view, that the outline and structure of the Aralo-Caspian region, as now seen, was determined, as I have said, long anterior to the historical era.

On the point of the prehistoric separation of the Aral from the Caspian, I entirely concur with Humboldt. "If we ascend," he says, "to the primitive condition of the vast Mediterranean concavity, I should be led to believe that, notwithstanding the diminution of surface which the Caspian and Aral basins may have undergone in the historical times, from Hecætæus and Herodotus down to the tenth century of our era—i. e. to the days of

the Arab geographers El-Istachry and Ebn Haukal—the event of the separation of the Aral and Caspian remounts to a geological epoch, which, like the separation of the Euxine and the Caspian, or the opening out of the Dardanelles and the Straits of Gibraltar, are all ante-historical, or far beyond any human tradition.”\*

In sustaining this view it is to be remarked that, whilst the Aral Sea trends from north to south, the Syr Daria and its embouchment the Kuvan Daria, which flow into it from the east, have had courses at right angles to that sea itself; thus favouring the geological view that the great movement which produced the plateau of the Ust-Urt, separated the Sea of Aral from the Caspian, and left the chasm occupied by the Aral, was also accompanied (as is usual in such elevations) by transverse flanking openings in the mainland, on the east, along which those rivers flowed. In this view the parallelism of the Syr Daria to that of the Kuvan Daria, about 50 miles south of it, is remarkable.

If the Jaxartes ever flowed to the south-west, as suggested by Sir H. Rawlinson, it must have joined the Oxus long before the united streams fell into the Caspian, which is very distant from the nearest point of the valley of the Oxus. But if such an union of the great streams ever existed in so southern a latitude, it must have been perfectly well known to the ancients, and they have made no allusion to it. On the contrary, they believed and have stated, that the rivers fell independently into the Caspian, and by different courses, separated from each other by a wide interval.

Whilst I think that, probably, the many-mouthed Oxus always sent a large portion of its waters into the Aral, I also quite believe that one of the branches debouched formerly into the Caspian, as explained by Humboldt, and as proved indeed by the old English traveller Jenkinson, to whom he refers. It will also be presently seen that the distinguished Asiatic geographer Semenof would explain the desiccation of the former or Caspian branch of the Oxus in another manner. The stoppage of that watercourse (formerly an usual line of traffic) may also be accounted for by a local elevation of land in that latitude; for it is not remote from the scene of igneous eruptions that produced volcanic mountains, as the greater and lesser Balkan, near the ancient desiccated mouth of the Oxus. Such a change of level may, indeed, have been caused by the same subterranean

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\* Humboldt, ‘Asie Centrale,’ vol. ii. p. 146.

forces which, in this latitude, evolve, at the present day, the fires of Baku, and have recently thrown up volcanic mud-islands near the southern end of the Caspian. The elevating effect of these forces would deflect the Caspian branch of the Oxus and cause its waters to unite with the branches which flowed northwards into the Aral Sea.

The great distinction between the views taken by Sir Henry Rawlinson and myself is, that whilst I believe the main outlines of the Aralo-Caspian region were determined by movements of the earth in quaternary or later tertiary times, he refers the great changes which he believes to have been made in the courses of the Oxus and Jaxartes to no very distant historical dates; thus referring the emptying and refilling of the deep hollow in which the Aral Sea lies to comparatively modern times.

He offers, indeed, one argument, which, if sustained, would at once dispose of my view. In support of the opinion that the Aral Sea was non-existent in the thirteenth and fourteenth centuries, he states that in those days travellers from Europe to Asia passed over dry lands since occupied by that sea. If this were substantiated, the belief I have adopted that the separation of the Aral from the Caspian, and the upheaval of the broad intervening plateau of the Ust-Urt, would be at once removed from a pre-historic period to the days of Henry III. and the two first Edwards of English history.

Now, surely, if so great a terrestrial change of surface as this had happened in the thirteenth or fourteenth centuries, the rumour of it would have been bruited throughout Europe and Asia. Unwilling, however, to rest upon any notions of my own, I have consulted that admirable comparative geographer, Colonel Yule, as to the routes taken by the mediæval travellers of that date; and he having favoured me with much information respecting the whole of this subject, I extract from his letter the appended long note.\* By reference to it the reader will see that no foundation for such an assertion is to be traced in the narratives of these old travellers. For even when the starting point of their journey eastward lay upon the Volga, their line of march is traced either quite to the south of the Aral through the lands of modern Khiva, or more to the north of that sea, and probably beyond sight even of its shores.

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\* After alluding to the little weight to be attached to the statements of the Greeks, tracing the imperfect accounts of Herodotus and his followers, and rejecting the Oxiana Palms of Ptolemy, which had been made "to do duty," as he says, for the Aral on many respectable maps, Colonel Yule proceeds to say:—

"We are on surer ground in the narrative of the Embassy of Zemarchus to the Khan of

In considering what changes have or may have occurred within the historic period, and quite independent of all former or geo-

the Turks about the year 570. The remains of the historian Menander, which relate this mission, are unfortunately but fragments, and do not say how Zemarchus got from Byzantium to Central Asia. But on his return route, which lay to the north of the Caspian, we are told that before reaching the rivers *Ich* and *Daich* (apparently the modern Emba and Ural) <sup>1</sup> he passed for twelve days along the sandy margin of a certain *great and wide lagoon*. This looks very like the Aral; nor probably will Sir Henry Rawlinson deny its existence at that date. But I quote the allusion to show that even the Greeks, once they got actually to the site of the Aral, did recognise its existence.

"We now get to a period regarding which there is no controversy. A long *catepa* of geographical works, as Sir Henry Rawlinson tells us, represents the two great rivers as falling into the Sea of Khwarezm, *i. e.* the Aral. But is it the case that this chain of testimony ceases with the year 1800? Among those quoted by Humboldt even are some of later date, such as Abulfeda and the Persian Hamdallah. It is the case, no doubt, that those Eastern geographers often copy what has been said by their predecessors centuries before; but a passage which Humboldt quotes from Hamdalla, a writer of the 14th century, appears to be original. It speaks of the Sea of Khwarezm (or Aral) as having a compass of 100 parasangs, and separated from the Caspian by a tract of 100 parasangs in width. It contains also the remarkable statement that only a *part* of the water of the Oxus then flowed into the said sea, which was fed also by the River of Ferghana (the Jaxartes) and others.

"Two centuries later, when the first English traveller <sup>2</sup> reaches those regions, he finds the Aral in existence, though his account of it is but hazy; and when Russian geography springs up at the end of the 16th century, we find that it already knows the Aral well as the Blue Sea.<sup>3</sup>

"Knowing then, as we do, how many indications point to the existence in those regions in recent geological times of a great inland sea, and finding a tolerable chain of evidence as to the Aral itself—either positive or implicit—down to the days of modern geography, I feel it difficult to believe, on the authority of the Persian MS., that this great sea, nearly 600 miles in circuit, with precipitous sides and attaining a depth of 37 fathoms, did, for a number of years, entirely cease to exist, and then again became as we see it and as old Arab geographers had described it. I by no means desire to dispute that there may have been a material contraction of its area at the time when a considerable part, if not the main stream, of the Oxus flowed into the Caspian; but this is a different thing from its entire disappearance and desiccation.

"There is one argument on this subject urged by Sir Henry Rawlinson which I think a review of the facts in detail will scarcely bear out. He refers to that period during the 13th and 14th centuries when the vast extent of the Mongol domination threw open Asia, which for a succession of years was penetrated by envoys, missionaries, and adventurers, several of whose narratives have come down to us, and when a regular course of trade was established, regarding which we have many particulars.<sup>4</sup> The route usually followed by those travellers, Sir Henry says, lay exactly across the site of the Sea of Aral; yet not one of them mentions it. If this were so indeed, it would be vain to maintain the *improbability* of what would be the case.

"But let us glance at the first of them, the Venetian traveller Marco Polo, the first of them in the middle of the 13th century. He was sent on a mission from the Pope to the Great Khan in 1245-47. Friar John, though he

<sup>1</sup> "Perhaps, however, the *Ural* and *Ik*, so carrying the route north of Orenburg."

<sup>2</sup> "Jenkinson."

<sup>3</sup> "See in Levchine's 'Description des Hordes et des Steppes des Khirghiz Kazaks,' in his dissertation on the Jaxartes, p. 462, a quotation from a Russian geographical work of the time named."

<sup>4</sup> "Surely there is a *lapsus*, when Sir Henry Rawlinson speaks of these merchants as returning with the *tea* and silk of China; or, if he has grounds for including the former, it would be most interesting that they should be produced. In 'Cathay,' I have indicated the mention of tea by Ramusio's Persian friend Hajji Mahomed, as the first known to me in any European book."

logical changes, I necessarily attach great weight to the opinion I have recently obtained through my friend General Helmersen from

writes in the main like a man of sense and reading, is not a good geographer. He makes the Dnieper, the Don, the Wolga, and the Jaic all fall into the *Great Sea*, the '*Mare Magnum*, which has its issue by St. George's Channel at Constantinople;' and rides for many days along the shores of the Caspian, apparently under the impression that it is but a part of the Euxine.<sup>1</sup> We might ask, in passing, if there were no Friar Johns among the ancients capable of the more venial error of confounding the Sea of Aral with the Caspian? Be this as it may, there is no reason for carrying the route of Carpin's party over the bed of the Aral. After crossing the Jaic, it lay for many days through the land of the *Cangitas*, or Kankhlis, in which they found few people, but very many and large salt-marshes and lagoons, which they took to be the *Paludes Maoticides* of the ancients, and which probably were those which still exist to the north and north-east of the Aral.<sup>2</sup> They then enter the land of the *Bisermini*, or Mussulmans, and come upon the cities and cultivated lands of northern Turkestan.

"Friar William de Rubruquis, eight years later, is more correct in his notions of geography. He clearly discriminates the Caspian from the Euxine, and gives a fair account of it. He gives also the general orientation of his route, running due east from the Wolga for 45 days and then turning southward, and so continuing for eight days till he reached *Kenchak*, a city known to have been in the valley of the river Talas. If you protract this route as well as the data will admit, you will find that it entirely clears the Aral.<sup>3</sup>

"Another traveller, who visited the Court of Mongolia in the same year with Rubruquis, was King Hethum or Hayton, of Little Armenia. He, too, after visiting Batu Khan upon the Wolga, rides eastward across the Jaic; but, as he passes the Irish also, his route must have lain far to the north of the Aral. On his return he passed by Samarkand and Bokhara into Persia.

"Marco Polo himself never mentions the Aral, indeed; but neither does he mention the Jaxartes, and seems never to have been nearer either than at Kashgar. In the preliminary chapters of his book, in which he speaks of the journey made by his father and uncle from the Wolga to Bokhara, he unfortunately gives no particulars of their route,<sup>4</sup> excepting that they went south from Bolghar to Ukak (near Saratov) before striking east.<sup>5</sup>

"Probably, however, it was the same as that laid down in the next century from the information of the merchants who had travelled it, by the Florentine factor Balducci Pegolotti, about 1330-1340. This route, followed by mercantile travellers bound for China, ran from Sarai, on the Wolga, to Saracanco, or Saraichik, on the Jaic, and thence in camel-waggons to URGHANJ, the capital of Khwarezm, which stood on a branch of the Oxus, about 60 miles south of the present embouchure of that river in the Aral Sea. From Urghanj the travellers were in the habit of proceeding to OTRAR, a few miles north of the Jaxartes, and not far from the modern town of Turkestan, and so forward to Almalik, near the Ili, the capital of the Khannate of Chagatai. They thus travelled distinctly round and not across the bed of the Aral. We are told, indeed, that if they had no merchandise to dispose of at Urghanj, they might save from 5 to 10 days by going direct from Saraichik to Otrar. If we lay down this direct route with directness, it will indeed pass through the extreme north of the Sea. But direct railway lines are not so straight as that; and there can be little doubt that Pegolotti's direct line was much the same as that followed by Carpin and Rubruquis in the preceding century.

"The same route that Pegolotti recommends—viz., that from Sarai to Saraichik, and

<sup>1</sup> "See in D'Avezac's edition, p. 743."

<sup>2</sup> "See the narrative of Carpin's companion, Benedict the Pole, in D'Avezac, p. 777."

<sup>3</sup> "For a detailed examination of Friar William's route see 'Cathay and the Way Thither,' p. cxi. seqq."

<sup>4</sup> "The *Tigeri*, or Tigris River, which Polo mentions as crossed by the party, was supposed by Marsden and his successors to be the Jaxartes; but Pauthier has clearly shown it to be the Wolga. (See his '*Polo*,' p. 8; also '*Cathay*,' p. 234.)"

<sup>5</sup> Timur, invading Kipchak and Russia, went so far north as to cross the Tobol before crossing the Jaic.

M. P. Semenov, the President of the Physico-Geographical section of the Russian Geographical Society, who has distinguished himself by his researches in the Thian Shan chain of Central Asia. Whilst he rejects, like myself, the hypothesis of the great Aral depression having been emptied and refilled in the historical period, he refers the desiccation of the Asiatic rivers and the diminution of lakes to the decrease of glaciers in the high mountains, as well as to great evaporation. By these causes he thinks that at one period the Aral Sea may have been diminished, though he is firmly of opinion that such a deep depression could not have been emptied and refilled. In reference, however, to the former Caspian branch of the Oxus, in the existence of which he believes, he supposes that many streams, now dry or nearly so, formerly

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thence to Urghanj and Almalik—was followed by Friar Pascal, of Vittoria, in 1337,<sup>1</sup> and (as far as Urghanj) by Ibn Batuta, a few years earlier, in travelling from Sarai to Bokhara.

"It was probably also the route followed by John de' Marignolli, on his journey towards Peking, in 1339-42; but, unfortunately, he says nothing whatever of his route between the two Mongol capitals of Sarai and Almalik.

"We have named all the travellers, as far as I am aware, that have left any record of their journeys in those regions during the period to which Sir Henry referred. None of them, we must acknowledge, say anything of the Aral Sea; but we see also that it cannot have existed, for it gave the practical disproof of its existence which would be dryshod across its bed! and the travellers' narratives were the Sir Henry has referred. The Catalan map does not, indeed, contain the Sea of Aral; but neither does it contain any hint of the Jaxartes. The great map of Fra Mauro, though it contains no Aral, represents the river Amu (or Oxus) as flowing into the Lake Issik-kul, which is, perhaps, an adumbration of some knowledge of its discharge into another sea than the Caspian. The traditions of geographers are hard to correct. I do not know what map first shows the Aral under anything like its proper conditions. Many years after the date of the Russian 'geography' to which we have alluded as so clearly indicating the Aral under the name of the Blue Sea, we find John Blaeu, in his great atlas (1663), representing the Jaxartes as flowing into the Caspian, and a duplicate of the same river, under the name of *Sur*, flowing by Tashkend into the 'Lake of Kathay,' with a difference of 80 degrees of longitude between the two! Even Petis de la Croix, in the maps (sometimes singularly happy) which illustrate his translation of the History of Timur, has no indication of the Aral.

"There is, indeed, one mediæval map which at first sight seems to bear strong testimony to the existence of the Aral Sea in the beginning of the 14th century. I mean that curious one executed by the old Venetian Marino Sanuto, and submitted by him to the Pope and King of France, about 1325, with his grand scheme for the destruction of the Mohammedan power. This map exhibits very clearly a *Mare Yrcanum*, *Caspis* or *de Sara*, in the proper position of the Caspian. It is connected by a river with another sea, further east, marked *Mare Caspium*, and full of islands, which is in a startling degree suggestive of the Aral. Further still to the east, towards *Sera*, appears a third and smaller sea, without a name, into which the *Gyon* flows (*i. e.* Jihun or Oxus). I dare not, however, lay much stress on this map, which contains almost nothing else to corroborate a claim to exacter information. The multiplied seas may have sprung only out of some misunderstanding of the classical geographers."<sup>2</sup>

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<sup>1</sup> "Cathay," p. 232."

<sup>2</sup> "The map is engraved in 'Bongarsius, Gesta Dei per Francos,' vol. ii. There is a quasi facsimile of it in the second volume of Vincent; but in this latter the third sea is scarcely to be recognised."



augmented the volume of the Oxus, thus enabling it to supply a branch to the Caspian by the Gulf of Karabogas, and that to the failure of this supply we may attribute the drying up of the branch, without involving any great physical change of outline of the land. In this case the Aral Sea, occupying a separate cavity not communicating with the larger depression, would, as he thinks, become shallower, and to a great extent obscured by reeds, so as to have remained unknown to travellers for 500 years before and 500 years after Christ. M. Semenov suggests that in those days when the South-western branch of the Oxus existed, travellers proceeding northwards and meeting with little but reeds and marshes, might very well suppose that the Aral was merely an extension of the great Bay of Karabogas of the Caspian Sea. In illustration of this view he informs me that the inhabitants around the lakes Ala Kul and Sassyk-Kul have at this day no precise conception of their separation, and term them both Ala Kul simply, because they are unacquainted with the marshy and inaccessible isthmus between them. In Central Asia, too, the River Tohu, through its desiccation, has lost its former communication with the Lake Issyk-Kul, just as in the Aralo-Caspian region the Sary-su River has failed to reach the Syr Daria; and this last river, having lost its northern affluents, could no longer contribute (if ever it did) by any of its branches to the Oxus, and has found an easier embouchure in the Aral. How easily these changes of direction are effected in the course of rivers in flat and sandy countries, is well known to many Russian geographers who have explored Central Asia.

Thus, the Oxus, deprived of many of its former affluents, ceased to be able to throw any portion of its waters into the Caspian, and took the straight course into the Aral. This natural operation, as Semenov observes, may have also been accomplished within the historical period, and so, since its South-western or Caspian branch dried up, the Oxus, by throwing all, instead of a part, of its waters into the Aral, has given to that sea a better marked place in human knowledge than it had in the fourteenth and fifteenth centuries.

Before I quit the subject of the now desiccated former branch of the Oxus, I may state, on the authority of my correspondent, General Helmersen, that recently a memoir was presented to the Imperial Geographical Society of St. Petersburg, suggesting that men of science should be sent to the spot to examine into the evidences of that ancient bed of the river, and also to test, by soundings along the shore of the Caspian, if any remains of the

old delta of that stream could be detected. But the project, as well as the continuation of the survey and soundings of the southern edges of the Caspian, have both been suspended, I believe from motives of economy. The latter important work was under the able direction of Captains Ivanchnizow and Oulsky, who had already proceeded so far that in less than three years they would have completed the survey of the whole of that vast interior sea; and it is indeed much to be regretted that a work of such great geographical interest should have been thus set aside.

In conclusion, my belief is:—1. That the Caspian and Aral have existed as separate seas before and during all the historic period. 2. That the main course of the Rivers Jaxartes and Oxus, as also of the sites of the Caspian and Aral seas, were determined in a prehistoric period. 3. That at one time the Oxus emptied itself both into the Caspian and the Aral, and that the Caspian branch-stream was sent back to the course of the other portion of the stream, either by the local rise of some lands between Khiva and the Caspian, or by desiccation and a want of sufficient power of water. And, lastly, that the Jaxartes never was deflected from its natural east to west course, to pass southwards, and so reach the Caspian by the southern end of the great elevation of the Ust-Urt, after a very long course at right angles to its present direction, to say nothing of its having in that case necessarily united with the Oxus by the way—a fact, of which, as already stated, all history is silent.

If old authors believed, without personal observation, that the Jaxartes, as well as the Oxus, fell independently into what they called the Caspian, we may easily account for such a notion, at a time when the true meridian of barbarous places lying to the north of any line of intercourse between Greece or Rome and Asia was wholly undetermined. May we not rationally infer that the ancient geographers believed that the Jaxartes, as well as the Oxus, flowed into the Caspian, simply, as suggested by Rennell, from having heard that the Jaxartes terminated in one great sea, and that they naturally believed that the Aral was then simply the north-eastern portion of those large inland waters of which they had heard, but of which they knew nothing accurately.

In truth, when we know that the geography of the Greeks, and even of the Romans, was worthless, in regard to any lands beyond the parallel of the mouth of the Oxus, we necessarily recur to the works of the earliest Arabian geographers, in which the Sea of Khwarezm was first exhibited as a separate sea. As such it also appears in

the maps of Rennell, of Williams, of Yule, and, in short, of all the best authorities, representing that which I believe to have been the true physical condition of the region during all historical time, and which I maintain dated from an ante-historical period.

In estimating the present or future relative importance of the Oxus and Jaxartes as lines of commercial traffic with China and India, I have no hesitation in saying that the latter river holds the first place. By reference to the memoir of Lieut. Wood, in the tenth volume of our 'Journal', describing the sources of the Oxus, and still better by inspecting the map of the Bolor Mountains and Upper Sources of the Oxus, which has just appeared in our present volume (vol. 36), I agree with the able Russian geographer Veniukof, who, after alluding to the wild barbarian races which occupy the high tableland of Pamir and the adjacent mountains, adds this significant passage: "When we, moreover, remember that this basin of the sources of the Oxus is closed in on the north, east, and south by mountains from 15,000 to 18,000 feet high, and across which the roads for pack-animals are few and difficult to traverse, we must arrive at the conclusion, that all idea of converting this region into a rich entrepôt for a trade with India and China must be abandoned." \*

Before I quit the subject of the investigation of Central Asia, let me ask those of my countrymen who read German with facility, to peruse the great work of Ritter, the 'Erdkunde von Asien:' and they will at once learn how to value the vast amount of modern discovery which is due to our Russian cotemporaries.

On former occasions I have naturally adverted to several of these remarkable researches; but I regret that, in my last two Addresses, I have omitted to notice, as I now do with special approbation, the memoir of M. Semenov, published in our Thirty-fifth Volume, on 'Djungaria and the Celestial Mountains.' As the only man of modern times who has explored a considerable portion of the Thian-Shan or Celestial Range, M. Semenov must be placed among the most distinguished of the famous band of Russian explorers—not simply for having determined many geographical positions, the forms of the land and their altitudes, but also for his careful examination of the mineral character of the rocks which constitute the loftiest masses of those regions. In so doing, he has set aside one of the few errors which the illustrious Humboldt fell into in his grand generalizations, when he was led to believe that the Thian-Shan—

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\* 'Journal of the Royal Geographical Society,' vol. xxxvi. p. 263.

the great axial range of Central Asia—must be essentially one of volcanic eruption.

Influenced, doubtless, by his successful description of the Andes of South America, and the rise to their summits of active volcanoes, the great traveller was very naturally disposed to apply the same inference to the lofty chains of Central Asia; the more so as all the imperfect data he could collect seemed to indicate the existence of rocks of that class.

But as soon as the Thian-Shan was examined by the only man of science in our age who has visited it, he found nothing but sedimentary strata; and as this important rectification is due to M. Semenov alone, we must not only accord to him all due praise as a Geographer, but it is specially my duty as a Geologist to thank him for making this great observation.

In fact, the grand movements of upheaval, which determined the form of many of the loftiest mountains, whether in Central Asia or in the great northern barrier of India, the Himalayas, were caused by former expansions from the interior, doubtless due to central heat, which raised up sea-bottoms, often altering them into crystallised rocks, and elevating them to enormous altitudes, without exhibiting any true igneous rocks.

Having already twice alluded to the recent discoveries in Asia by the Russians, and we having endeavoured to do honour to them by the award of our Founder's Medal to one of the most distinguished Russian explorers, it is now my pleasing duty to advert to others of their recent labours in that quarter of the globe.

On former occasions I have dwelt upon the explorations of Eastern Siberia and the affluents of the grand River Amur and the mountains to the north. Let us now turn to Central Asia proper, and see what good documents have been furnished by the different men of science who have explored those regions. I gather from the bulletins of the Imperial Geographical Society that the communications of MM. Semenov, Severtzof, Poltarazky, Abramof, Bakko, Goloubef, and Printz, explain the physical conformation of tracts and the natural riches of regions never before reached in modern times.

Of most of these hitherto unknown and wild tracts the Russian explorers have prepared or are preparing maps. To facilitate journeys from Siberia to Peking, Dr. Bretschneider, the physician to the Russian mission in China, has laid down upon a map all the different known roads across Mongolia, of which that which

is called the post road is 1760 versts long, between Kiachta and Pekin, with 68 relays. If the telegraph, which one of our countrymen, Mr. Gordon, who had travelled across this desert, sought to realize, be established, the journey across the desert of Gobi will soon be thought nothing of.

As to Bokhara, of which Englishmen have only painful recollections, on account of the murder of our distinguished officers, Conolly and Stoddart, we now know that two Russians, MM. Gloukovsky and Tatarinof, who were for seven months captives there, have added much knowledge to that acquired by their accomplished countrymen Khanikoff and Lehmann in 1842.

Those of our associates who may now visit St. Petersburg may see pictorial views of Khodjend, Tashkend, and all the places taken from the Kokandians in the recent advance of the Russians along the Syr Daria, and now forming parts of the great new province of Turkestan. I learn also, in reference to this region, so recently opened out to the civilized world, that M. Struve, the son of the great Russian astronomer, has prepared a map of the whole province of Turkestan, on a scale of 40 versts to the inch.

Deeply interested as we must all be in this grand opening out to geographers of a vast unknown country, my first request to my eminent friend Admiral Count Lütke must be, that as President of the Imperial Geographical Society and also of the Imperial Academy, he will procure for our Society copies of the maps which, to their great credit, the Russian geographers have prepared.

*Northern Frontiers of British India.*—At our last anniversary it was my duty to dwell upon the great accession to geographical knowledge obtained by the survey of Captain Montgomerie in the mountainous region north of Cashmir and the Himalayas Proper. I have now to remind you of the highly interesting journey made by Mr. W. H. Johnson, from Leh, in Ladakh, to Ilohi, in Chinese Turkestan, a city which had not been reached in this century by any European since the days of Marco Polo and the Mediæval travellers, except by Adolf Schlagintweit, who was killed. This town lies further northward than any point reached by his brothers when they traversed the Kuen Lun.

The clear and eloquent manner in which this great feat on the part of an Indian engineer, brought up under Sir Andrew Waugh, was laid before the Society by Sir Henry Rawlinson, renders all comment on my part superfluous. For he not only delineated the

achievement of that traveller, but put you completely into possession of all the historical data relating to this vast and little-known region, the routes used in old times for traffic, and pointed out to you how it happened that Ilchi, once a great mart on the highway between Russia and China, had been left aside on account of the more favourable route by Yarkand. Although I have always discouraged discussions on the political interests of our own country in reference to those of other nations, I entirely agree with the observation which fell from Sir Henry Rawlinson, that both the Russians and ourselves might trade advantageously with that great intermediate region, and that at the chief cities of each, consuls of either nation might live together in perfect amity.

When that state of things shall have arrived, our geographers would no longer be wanderers, stealthily seeking to acquire knowledge, but would be associated with Russian topographers in defining the physical features of wide tracts, which, though useful to both countries for trade, are far too vast to be objects of settlement for either.

The mineral products of this region are, no doubt, as numerous and important as Sir Henry Rawlinson described them to be, particularly in gold and jade, and the opening up of a fresh trade might be highly beneficial to ourselves and to Russia, now that the Chinese domination has been entirely set aside.

*Tibet.*—The survey of Lake Pangkong in Tibet, by that intelligent and active explorer, Captain Godwin Austen, is another fact of marked interest in the delineation of tracts lying to the north of the frontiers of British India. Passing from Leh over the Chang La Pass, 17,470 feet above the sea, this traveller, like Dr. Thomson in other adjacent tracts, encountered the most enormous accumulation of debris which had been swept down from the Snowy Mountains, occasionally barring up the streams. He followed the great lake to within a short distance of Noh, a Tibetan town of the province of Rudok. Although the Lake Pangkong has now an altitude of 13,981 feet above the sea-level, Captain Austen showed, judging from traces of remains of shells at considerable altitudes, that its waters must once have stood at a much higher level. At that remote period the waters were fresh and the country covered with rich vegetation; but now the waters of the lake are much too salt to nourish any molluscous animals, and its banks are entirely destitute of vegetation.

*Site for a New Indian Capital.*—At one of our evening meetings in

January a valuable paper by the Honourable George Campbell, a Judge of the newly-instituted Supreme Court of Judicature for the Bengal Provinces, was read and discussed. The subject was an enquiry into the most suitable site for a new capital for our Indian empire, there being a pretty general agreement in the condemnation of the present metropolis. Had it been possible to foresee the present extent of our dominion, it is almost certain that Calcutta would not have been our choice. It is situated at a corner of our dominion, all the most valuable portions of it lying north, south, and west of it, sometimes at distances of 1000 or 1500 miles. It lies in the delta of a great river, almost on the Tropic. The result of this locality is that the climate is unsuited to the constitutions of the denizens of a cold and temperate region, one-third part of the year only being congenial, while the remainder is divided between great heat and drought and great heat and moisture. In such a climate Europeans cannot labour out-of-doors without imminent peril to health, and the consequence is that most Englishmen, from the Governor-General downwards, abandon Calcutta, if they can, for two-thirds of the year. Still, as the port of the mighty Ganges, Calcutta is truly a metropolis. Although at first a village, it was the seat of our commercial factory; and Bengal, to which it belongs, was our first profitable acquisition—that acquisition, indeed, which, in the sequel, enabled us to make and maintain future territories.

The desirable points to be held in view in the selection of a second capital for India are, that the locality should be central, that the climate should be so temperate that the ruling class should be able to labour effectively without detriment to health, and that the locality should be secure from the dangers of foreign and domestic aggression. There are, no doubt, other qualities which it would be convenient to combine with these, but which are probably nowhere attainable. It would, for example, be desirable that the capital should be situated in a fertile and productive territory, capable of sustaining a large population, but such a position could only be found in the low and hot valleys of the great rivers. It would perhaps be desirable that the seat of government should, at the same time, be a great commercial emporium; but this advantage cannot be combined with the more indispensable requisite of a temperate climate, since all the possible commercial emporia of India are tropical, and on the sea-level. It would be desirable that the Government of India should have the benefit of a public opinion at its

seat; but this does not seem to be indispensable, for with the rapid communication which exists in our times, and which has been extended even to India, the public opinion of great provincial towns may be as effective as that of any capital.

Even centrality of position has, by the discoveries of steam navigation, the railway, and the telegraph, become of far less importance than it once was. The same discoveries have contributed to diminish greatly the risks of domestic insurrection, and as to danger from a foreign enemy, our substantial protection is not local, but rests on England, and the pre-eminence of England's navy.

The author of the paper points out the neighbourhood of a town called Nassick as the most suitable site for a new capital of India. Nassick is an inconsiderable Mahratta town, and a famous place of Hindoo pilgrimage. It has a fertile territory, is but 120 miles from Bombay, and on the line of one of the great railways; but then it is two degrees within the Tropic, and but 2000 feet above the sea-level, so that its summer heat cannot but be very considerable. Nassick did not receive the general approval of the able and experienced Indian officers\* who discussed the question at our meeting. Some of the speakers expressed a favourable opinion of the Neilgherry Hills, a mountain range which covers an area of 600 square miles, and already the seat of several *sanatoria*, and which contains several extensive plateaux, which rise from 5000 to 7000 feet above the sea-level, with a reduction of temperature corresponding to these altitudes, and not unlike the climate of an English summer, although lying between the 10th and 11th degrees of latitude.

*Delta of the Indus.*—In the course of the session, a paper of eminent ability on the Physical Geography of the Lower Indus, was read by Colonel Tremenheere. It gave rise to a spirited discussion on a disputed question of engineering; but as engineering is not a special branch of geography, we, according to our usual practice, offered no opinion of our own. Exclusive of all theory, however, the subject of Colonel Tremenheere's communication, which includes in a direct line to the sea, 330 miles of the lower course of the Indus, and, incidentally, the harbour of Kurrachee, the only navigable entrance to the Indus, is of unquestionable importance.

The Indus, with its harbour, Kurrachee, I may observe, is to Western India what the Ganges and Calcutta are to Eastern India.

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\* For the various opinions expressed by Sir Henry Rawlinson, Sir Charles Trevelyan, Sir Robert Montgomerie, Sir Erskine Perry, and others, see 'Proceedings' R.G.S., vol. xi. p. 74.



No doubt the Indus and its affluents, passing as they do through a comparatively sterile and under-peopled region, are of far less value to agriculture than the Ganges with its affluents, which water the most extensive, fertile, and populous parts of India; yet it has its special advantages. For vessels of burden its navigable course is more extensive; it is our natural frontier at the only quarter from which our Indian dominion can be assailed, while it is the great highway to the possible points of attack. The port of Kurrachee has even some advantages over that of Calcutta. The navigable difficulties incurred in reaching it from the open sea extend only about 10 miles, while in the case of Calcutta they extend over 150. Kurrachee has, besides, the advantage of being from 2000 to 3000 miles nearer to England—the true source of our Indian wealth and power—than Calcutta. Kurrachee was, like Calcutta, a small village when we took possession of it only 24 years ago. It is now a considerable, well-built town, and its importance as a commercial emporium may be judged by the following simple fact. Its joint export and import trade in 1844 was of the value of 122,160*l.*, and on the average of the four years ending with 1866, it amounted to 5,500,000*l.*

Independent of the political and commercial advantages of the Indus, with its harbour, it is not to be forgotten that Kurrachee is the only port existing on the western side of India, with the exception of the fine one of Bombay. India, meaning by this the proper country of the Hindus, is, for a great, populous, and wealthy region, singularly deficient in good harbours. On its eastern side it has not one until we arrive at the head of the Bay of Bengal, where we find Calcutta, made tolerably safe, only by dint of great skill and heavy cost. It is worth notice, in a geographical sense, that the opposite coast of the same gulf forms, in this respect, a singular contrast, for here we have no fewer than four good and safe harbours, Negrais, Rangoon, Martaban, and Mergui, the three first being also the embouchures of navigable rivers. If we include Penang, which is on the same coast, we have five harbours, while large and populous Hindustan has but three.

*Kurdistan.*—In the mountainous region immediately to the north of the plains of Mesopotamia, and around the sources of the Tigris and Euphrates, our Consul at Diarbekr, Mr. I. E. Taylor, has been doing good work of late years in advancing geographical and archæological knowledge. In a former session of our Society, Mr. Taylor communicated to us the results of his researches during the

years 1861-3, when he explored the eastern head of the Tigris, verifying the description of Strabo, and discovering near it a record of an invasion of the country by one of the Assyrian monarchs. Returning, in 1865, to the scene of his labours, after a short visit to England, this persevering explorer has continued his researches in the direction of the Kara Su River, or Lycus of the ancients. He has lately sent us a brief preliminary account of this last journey, stating that he has traced this river to its sources and discovered the site of Pompey's Nicopolis. A more detailed account of these explorations, together with a map of his routes over districts never before visited by a European in modern times, is promised by Mr. Taylor, and will doubtless form the subject of discussion at one of our evening meetings early in the next session.

EGYPT.—*The Great Pyramid*.—Among recent publications, I must not omit to notice Professor Piazzzi Smyth's 'Life and Work at the Great Pyramid.' If our Government of late years has seemed too often chargeable with indifference to the promotion of scientific research in foreign regions, and even in its own dominions, there are still private Englishmen ready to devote their time and means to such researches. And as it is to the labours and munificence of one Englishman (Colonel Howard Vyse) that Europe owes all the most important discoveries regarding the general structure of the Great Pyramid, so now to the indefatigable work of another we owe the most minute and scientifically accurate measurement of its details that has ever been executed.

Before his visit to Egypt, Professor Smyth had become an enthusiastic advocate of the late John Taylor's theory of the Pyramid as a great metrologic record; and it was his desire to test and develop this theory by more accurate measurements that carried him to Egypt. His stay there has enabled him to produce a book of great interest, both in the narrative of his operations and in their results; and its connexion throughout with metrology, in the most comprehensive sense of the word, renders it a fit work for the consideration of the Geographical Society. Some of the measurements were performed under remarkable advantages, for Professor Smyth had the good fortune to see the whole four of the corner-sockets of the Great Pyramid, as originally excavated in the living rock, uncovered simultaneously for the first time on record. Yet the important measurement between those fiducial points was sorely obstructed by the masses of rubbish that

surround the pyramid, the removal of which is too costly for private means. Professor Smyth shows clearly that the Great Pyramid is not merely the greatest of a class, but stands *alone* in its proportions and constructive arrangements. He shows that though its entrance passages were so carefully sealed, the details of their elaborate structure clearly point to the anticipation of future disclosure, whilst marks indicating the way to such disclosure have even been discovered by Professor Smyth in the masonry of the first descending passage. He has gone far towards establishing beyond doubt the fact—which many still reject—that the pyramid was originally cased with smooth Mokattam limestone (not granite, as some have stated). His measurements demonstrate that the pyramid is (or rather has been) a true symmetrical figure on a square base, the orientation of the sides of which deviates from the truth not more than 5 minutes at most, whilst their *mutual* deviation does not exceed 35 seconds. They prove that the altitude of the pyramid is to the perimeter of its base in the ratio of the radius to the circumference of a circle; that the number of cubits in the length of the base symbolises to a fraction the length of the solar year; that the cubical capacity of the lower course of the King's chamber is just 50 times the interior content of the granite coffer which stands within it; whilst the exterior capacity of the coffer is just double its interior contents. These are only a very few samples of the results of the measurements in which Professor Smyth conceives that he finds the records of a metrologic system of the most scientific kind; of a standard of length based on the length of the earth's semi-axis of rotation; of standards of weight and capacity based on the earth's mean density and on the preceding standard of length; of time standards in the length of the year and the record of the Sabbatic week; nay of a standard of thermometrical and a scale of angular measurement. Some of Professor Smyth's concluding speculations and deductions are, doubtless, a little eccentric, and the least questionable of his results are astounding. But whatever may be thought of the more startling parts of the book, as a whole it is the record of a great undertaking scientifically executed, and it will doubtless produce much discussion among antiquaries and astronomers as well as geographers.

**SOUTH AMERICA.**—In my Address for last year I fully discussed, with the valuable aid of Sir Woodbine Parish, the geographical

questions which were solved by the exploration of the river Purús by Mr. Chandless. That most accurate observer ascertained beyond a doubt that the main branch of the great stream, which he ascended nearly to its source, did not extend to the mountain ranges of Peru. We have since received a full account of the second voyage of Mr. Chandless up the Purús, and of his exploration of its principal affluent the Aquiry, which he undertook in the season of 1865-6. He found no difficulty in navigating the Aquiry for the first 300 miles, even at the lowest stage of water, and considered it to be perfectly navigable for steamers up to the parallel of  $11^{\circ}$  S. Higher up it became wider and shallower, and his canoe was finally stopped by a network of stranded timber. After navigation became impossible, Mr. Chandless attempted to reach some river belonging to the Madre de Dios system, flowing from the Andes. He forced his way for a considerable distance through almost impenetrable forest, but, at the end of a week, was obliged to return for want of provisions.

While Mr. Chandless was thus, by an exhaustive process solving, in the negative, the question whether the streams flowing from the Cordilleras of Cuzco and Carabaya formed the river Purús, our Peruvian Honorary Corresponding Member, Don Antonio Raimondy, was furnishing us with information as to their true course. It appears, from our correspondent's narrative, that the enterprising Peruvian explorer Don Faustino Maldonado constructed a canoe in February, 1861, and embarked on the Madre de Dios with seven companions. He was drowned in passing a rapid, but his surviving comrades continued the voyage, entered the great river Madeira, and eventually reached Manaos on the Amazon, at the mouth of the Rio Negro. As the Beni is the only large river which flows into the Madeira on its left bank, it would appear that the rivers Madre de Dios and Ynambari, flowing from the Cordilleras of Cuzco and Carabaya, and which were so long supposed to be the sources of the Purús, are in reality tributaries of the Beni. Señor Raimondy's own valuable labours have comprised a careful examination of two tributaries of the Ynambari, in the province of Carabaya; but it is his intention to continue the exploration of this interesting and very important region in future years.

It is with great satisfaction that I have to announce the departure, by the last Brazilian Mail Steamer, of that most indefatigable and accurate scientific explorer, Mr. Chandless, to the scene of his former labours and triumphs. It is his intention, on this occasion, to

ascend the rivers Madeira and Beni, and thus at length to reach those streams flowing down the forest-clad slopes of the glorious Eastern Andes, which he had previously sought in vain at the head-waters of the Purûs and Aquiry. We shall look with much interest to the results of our Medallist's further explorations.

While on the subject of South America, I may mention that the attention of the present energetic and enlightened ruler of Peru, Colonel Don Mariano Ignacio Prado, has been turned to the opening up of the great fluvial highways between the Peruvian provinces in the Andes and the main stream of the Amazons, chiefly by way of the Pachitea, a river which our Lieutenant (now Admiral) Smyth endeavoured to reach in his courageous exploration of the year 1834. Three steamers were employed last year in exploring the Ucayali and Pachitea, and succeeded in reaching Mayro, 325 miles from Lima, on the 1st January, 1867; thus proving the Amazons to be navigable for 3623 miles, from its mouth to the eastern slopes of the Andes near Lima. The hitherto almost unknown River Javari has also been lately explored, to the extent of about 1000 miles, by a joint Peruvian and Brazilian boundary commission. This laudable activity, while developing the resources of these countries, cannot fail to extend geographical knowledge.

AUSTRALASIA.—In my last Address I recorded the progress of the Expedition in search of Leichhardt, which had been organised by a Committee of Ladies at Melbourne, incited by our learned and enthusiastic associate, Dr. F. Mueller, and which had been munificently supported by grants from the Colonial Legislatures, besides donations from the Queen and our own Society. Since then the able leader of the expedition, Mr. Duncan McIntyre, much to the grief of the promoters, has fallen a victim to a malignant fever now prevalent along the banks of the streams which flow into the Gulf of Carpentaria.\* Before this unfortunate event occurred, Mr. McIntyre had made good progress in searching for traces of the long-lost party, along the banks of the Albert, Gilliot, and Leichhardt rivers; questioning the natives and examining all the reports of white people living amongst the tribes. His journey across the continent, however, from the

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\* I am informed by Sir George Bowen, Governor of Queensland, in a letter dated 16th December, 1866, that the last accounts report an improvement of the public health in these districts.

River Darling to Burketown, on the Albert, has added but little to our geographical knowledge, the party having followed very nearly on the tracks of the former explorers, McKinlay and Landsborough. The death of Mr. McIntyre occurred on the 4th of June last; and I have lately learnt that Mr. W. F. Sloman, who succeeded to the command, has since also died. In this state of affairs, with the Expedition left to itself on the opposite side of the continent, the Ladies' Committee have entrusted its further management to Mr. Campbell, the uncle of the late leader, who has contracted to continue the search for the remainder of the two years originally contemplated, and has appointed Mr. W. F. Barnett as leader. By the last accounts from the Gulf of Carpentaria, dated December 21st, the party had resumed the search, and had obtained a valuable coadjutor in Dr. White; the camels were reported as in fine condition, and well suited for Australian travel.

In other parts of Australia the acquisitions to our geographical knowledge have been limited to local explorations in search of lands suitable for pasture or settlement. This has been especially the case with the colony of Western Australia, which has of late years added much to our information respecting the northern portions of its territory. Mr. R. J. Sholl has explored the neighbourhood of the Glenelg River and Camden Harbour, but without hopeful results as regards its capabilities for immediate settlement; and on his report the Provincial Government has abandoned the attempt to colonise the district. The settlement of the northern territory of South Australia has also proved a failure, and is now abandoned,—the survey of the neighbouring coasts and rivers undertaken by the Colony, with a view to discover suitable lands for colonisation, having borne no fruit. On the other hand, the progress of settlement in the tropical portions of Queensland, on the eastern coast, and at the head of the Gulf of Carpentaria, steadily continues. Another new township, named Carnarvon, has been formed in the Gulf, on Sweers' Island, to the north of the mouth of Albert River, where the harbour, named by Captain Flinders "Investigator Roads," is the only good one at the head of the Gulf. This is probably destined to become the principal seaport in this part of Australia, and the emporium for the settlements on the banks of rivers running into the Gulf. Upon the general subject of the advance of colonization in Queensland I entered into some detail in my last Address, and need not now recur to it, beyond calling your

attention to the able descriptive paper of Mr John Jardine,\* which gives so much information regarding the neighbourhood of our new settlement of Somerset, at Cape York.

*New Zealand.*—Since the publication of the valuable papers of Dr. Haast and Dr. Hector, on the glaciers and passes of the Canterbury and Otago Provinces, in the Middle Island, New Zealand, in the 34th volume of our Journal, the exploration of the rugged and almost impassable mountain-range which forms the backbone of the island, has been continued by the former of these gentlemen. Owing to the discovery of gold on the western coast at Hokitika, the Provincial Government of Canterbury were anxious to discover some nearer route over the mountains than the circuitous one by the Hurunui and Teramakau or Harper's Pass; and several parties were sent out to find, if possible, other passes. From this resulted the discovery of Arthur's Pass (3038 feet) near the head-water of the Waimakariri, by Messrs. Arthur and George Dobson, and the north Rakaia Pass (4645 feet) by Messrs. Browning and Griffiths, which latter reduced the distance between the east and west coasts by about eleven miles. On Dr. Haast devolved the duty of examining these different passes, and preparing a series of altitude sections by barometrical observations, to serve as a guide to the Government in choosing the best route. The task was accomplished in the latter part of the year 1865; Dr. Haast traversing the various passes, and, on his return to Christchurch, drawing up a series of admirable diagrams in illustration of the subject, copies of which, together with a descriptive paper, he has forwarded to me for presentation to our Society. The north Rakaia Pass was found by Dr. Haast to be deeply covered with snow in the early summer, and he states that the routes by Arthur and Harper passes (although considerably longer) will always be preferred by travellers, as they are seldom obstructed by snow, and are not subject to avalanches.

CONCLUSION.—In concluding this, the thirteenth, Address which I have delivered to you, I must now assure you that the Council ought to have selected some one younger than myself to occupy your chair. For in truth, my numerous avocations press so heavily upon me, that, with the heartiest desire to serve you, I am too well aware of my inability to efficiently perform all I could wish.

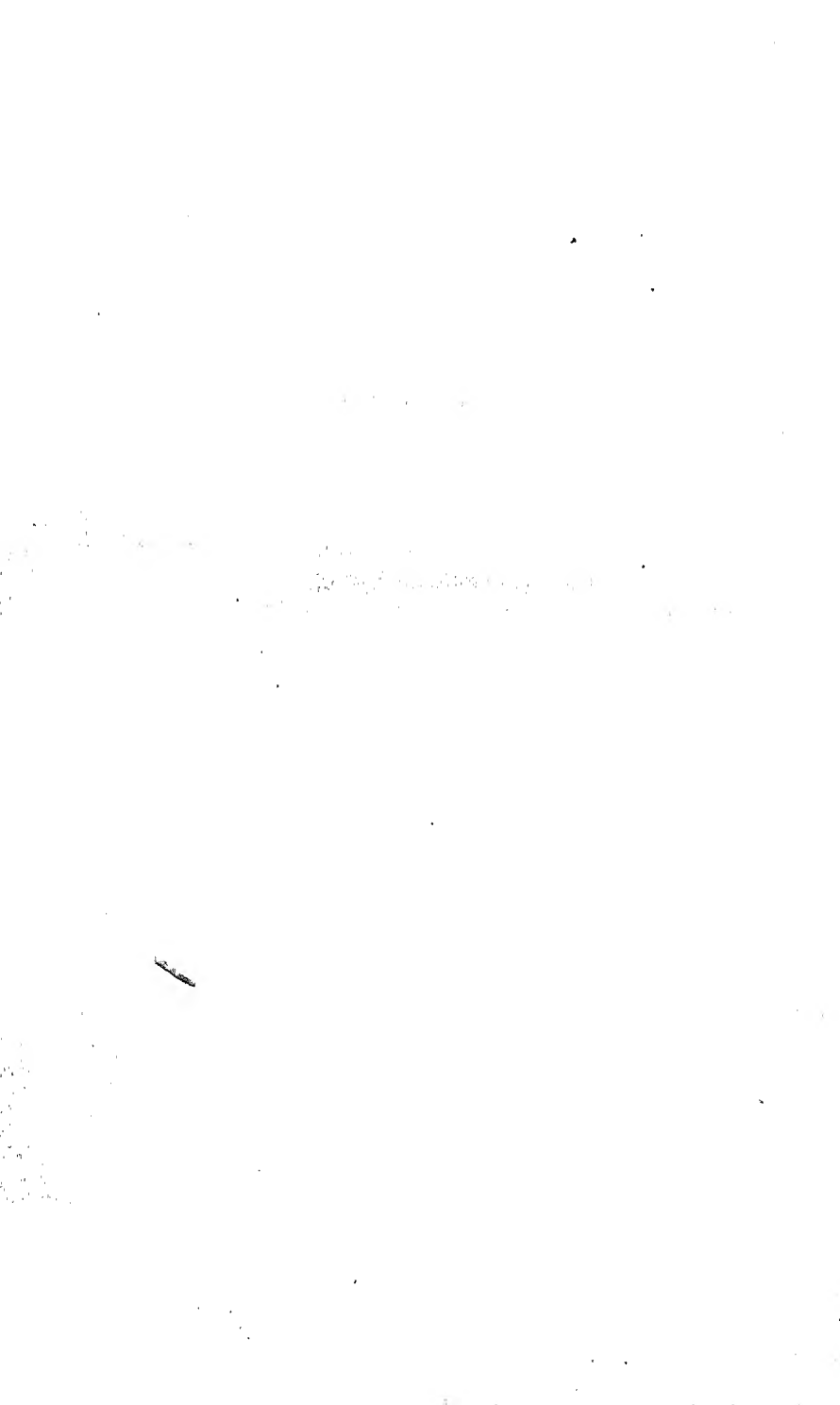
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\* See 'Journal R.G.S.' vol. xxxvi. p. 76.

Permit me, however, to explain, that if this Address is not as complete as it ought to be, my chief apology is that, as our anniversary approached, I was in the throes of bringing out a new edition of the chief work of my life, 'Siluria.' But whilst Geology has been the pursuit on which I have established whatever little reputation I possess as a labourer in the fields of Science, I know that you will believe me when I say that I have so loved Geography that I have through life considered these two great branches of knowledge to be inseparably connected. At all events, during my term of office as your President, I have ever striven to the utmost of my power to preserve the efficiency and augment the influence of the Royal Geographical Society.

If, then, you should be pleased to adopt the recommendation of the Council, and re-elect me, I promise you that, if I be spared, I will put forth what energy remains in me to carry out your wishes during the ensuing year. But really, when that term shall have expired, I trust you will place at your head a younger chief; and whoever he may be, I am sure when he has been but a year in office he will declare, as I have ever done, that the Fellows of this Society are men of whose support he may well be proud, and over whom it is a true honour to preside.





PROCEEDINGS  
OF  
THE ROYAL GEOGRAPHICAL SOCIETY.

[ISSUED NOVEMBER 4TH, 1867.]

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SESSION 1866-67.

*Thirteenth Meeting, 3rd June, 1867.*

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in  
the Chair.

PRESENTATIONS.—*Dr. J. R. Aldom; W. G. McIvor, Esq.*

ELECTIONS.—*H. A. Glass, Esq.; E. T. Higgins, Esq.; John Johnstone, Esq.; Robert Eadie, Esq.; Alfred Seymour, Esq., M.P.; John E. Watkins, Esq.* (Her Majesty's Consul, Chicago).

ACCESSIONS TO THE LIBRARY FROM MAY 13TH TO JUNE 3RD.—  
'Central Afrikanische Vokabularien,' von Heinrich Barth, 8 parts.  
'Geographisches Jahrbuch,' 1 band. Donor, M. Justus Perthes,  
Gotha. Five Papers on Ethnology, by John Crawford, Esq.  
Donor, the Author. 'Water Supply of Jerusalem, Ancient and  
Modern.' 'Proposed Water Supply and Sewage for Jerusalem.'  
(Jerusalem Water Relief Society), by John Irwine Whitty, Esq.,  
LL.D., D.C.L., C.E. Donor, the Author. 'Dell' Eclisse Solare del 6  
Marzo, 1867,' by Dr. Cacciatore. Donors, the Palermo Observatory.  
'Sullo stato presente dei lavori pel taglio dell' istmo di Suez,' di  
Monsignor F. Nardi. Donor, the Author. 'Report on the Irriga-  
tion of Eastern Spain,' by Clements R. Markham, Esq., F.S.A. Donor,  
the Author. 'Relation Originale du Voyage de Jacques Cartier  
au Canada, 1534.' Paris, 1867. Purchased. 'The Darien Indians  
and the Ship Canal:' a Paper by Dr. Cullen, 1867. Donor,  
General Balfour. 'Viaggio da Gerusalemme,' per Le Coste Della  
Soria, 2 vols. 'Villagiature de' Bizantini sul Bosforo Tragico,' by  
Luca Ingigi, 1 vol. Donor, Sir Charles Trevelyan. 'The Gulf  
Country:' a collection of papers containing the correspondence  
of W. Landsborough, Esq., with his Excellency the Governor of

Queensland. Albert River, July, 1866, to September, 1866. 'South Australia.' a collection of papers, containing a Report of J. McKinlay's Northern-Territory Explorations; also a portion of his Journal, and proceedings of the surveying schooner *Beatrice*. 'Report of the Central Argentine Railway, 1867.' From the Secretary. Engravings of Christopher Columbus, one by Fry and one by Schriener. A valuable collection of photograph Portraits of the Fellows of the Royal Geographical Society, by Maul and Company.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING.—Stieler's Hand-Atlas, in 14 parts, by H. Berghaus and A. Petermann. Missionary Atlas, by Dr. R. Grundemann. Stieler's Karte v. Deutschland, 3 sheets. Map of Hungary—Magyar Korona, by Berghaus-Gönczy. Map of the Holy Land, by Van de Velde. New Map of the Kingdom of Italy, by L. Schiaparelli and C. E. Mayr. Spruner-Menke, Atlas Antiquus, on 31 sheets. Chart of the World, by H. Berghaus and Stülpnagel. All the foregoing presented by Justus Perthes of Gotha. Map of the States and Territories from the Mississippi River to the Pacific Ocean, by G. and C. Colton. Map of California and Nevada, by L. Ransom, &c. Plan of Sweer's Island and Township, Gulf of Carpentaria, Australia. Landsborough's Route, from Bowen Downs to Neelia Creek, Queensland, Australia. Presented by Sir George Bowen.

The following Papers were read :—

1. *On Dr. Livingstone's Last Journey and the probable ultimate Sources of the Nile.* By ALEX. GEO. FINDLAY, F.R.G.S.

THE author stated that the object of his Paper was to demonstrate, as far as it was possible to do so inferentially, that Dr. Livingstone had reached, or was about to enter, the southern limits of the basin of the Nile, when the last painful news of him was forwarded from Africa. This conclusion was the result of a long-standing conviction that Lake Tanganyika would some day prove to be the southern reservoir of the Nile. The author had arrived at this when he was very much engaged with Captains Burton and Speke, in 1859, in discussing and calculating the very copious and most excellent data brought home by their nobly completed expedition of 1856-9.

The points which he wished to insist on were these :—

1. That Dr. Livingstone has determined that the Tanganyika Lake has no connexion with the Nyassa Lake :
2. That all known testimony makes the river at the South end of the Tanganyika Lake run into it :

3. That this Lake *must* have an outlet, and that this is probably to the North :

4. That the observations of Sir Samuel Baker, as compared with those of Captain Speke, make the Albert Nyanza on the same level with the Tanganyika Lake, and, further, that the two lakes probably join each other :

5. That therefore the streams which flow north-westward from the mountains at the head of the Nyassa Lake contain the true sources of the Nile.

Lake Nyassa was first seen by Dr. Livingstone Sept. 16, 1859. He had followed up the important River Shiré to its outlet from the lake. It was afterwards visited by the unfortunate Dr. Roscher, who reached it from Kilwa on November 19, two months after Dr. Livingstone had visited it. The lake is very deep, possibly much exceeding 116 fathoms, and has the deep blue or indigo tint of the Indian Ocean—a sufficient proof of its great depth. The eastern shore has not been examined ; but it is known to be limited on that side by lofty mountains. On the west the beautiful tree-covered heights, probably 4000 to 5000 feet high, are the edges of table-lands, through which flow five rivers, the only affluents on this side. These, with what others enter it from the east and north, will be sufficient to account for the annual rise of the lake (about 3 feet) in January, and for the flow of the Shiré.

The northern end of the lake is of the greatest interest in relation to the question now under consideration. It was visited, as is well known, by Dr. Livingstone's expedition, a second time, in October, 1861. The published narrative, and still more the conversations of Dr. Livingstone and Dr. Kirk, lead to the conclusion that no river of considerable magnitude enters the north end of the Nyassa Lake. From the height of at least 1000 feet, over which the land party toiled, the dark mountain masses on both sides of the lake were seen closing in. At this elevation the view extended at least as far as that from the boats ; and it was believed the end of the lake lies on the southern borders of 10°, or the northern limits of 11° s. lat.

The settlement of this point in the physical geography of East Africa carries with it the conclusion as to the water-parting of the whole of the river-systems between the Zambesi and the Nile. For, should any river fall into the north end of Lake Nyassa, it must be a very large one, draining, as it must do, an area of at least 300,000 square British miles, or a country as large as England and France combined.

Dr. Livingstone's first journeys to the Nyassa Lake, therefore,

did all but conclusively determine that Lake Tanganyika has no outlet to the southward.

It has been frequently argued, and especially by Captain Speke, that the Tanganyika Lake drained into the Nyassa. Their relative levels, as far as is known, would admit of such a theory. Dr. Kirk's careful and satisfactory observations, in August to October, 1860, makes Lake Nyassa to be 1522 feet above the sea, a much lower elevation than that previously assigned to it, and *at least* 300 feet, and possibly 1300 feet, below Tanganyika Lake.

Now, as Dr. Livingstone's last journey had for one of its primary objects the determination of this important point, it may be inferred, to a certainty, that his last journey confirmed his previous convictions. We know that he had crossed a marsh, which was found to stretch farther north than he had previously seen, and then continued his journey *westward*. If this marsh had been traversed by the course of a large river, such as the requirements of the case lead to the certain inference, he would have followed up this important feeder to the *northward*, and traced its connexion, if any, with the northern lake, or till its character was really determined.

The author, therefore, held it to be a point now settled beyond controversy, that Dr. Livingstone has determined that Lake Nyassa and Lake Tanganyika have no connexion with each other; and by that decision he has also determined, in a great measure, where we are to look for the true sources of the still mysterious Nile.

The second point was the direction of the streams running south of the Tanganyika Lake.

The distance from the north end of Lake Nyassa to the reported southern part of Lake Tanganyika is about 340 or 350 miles, and the direction is *N. 55° W.* Of the country immediately intervening we know nothing but from very imperfect native report. About the mountainous country further west we have more information, several important routes having traversed it.

First from Dr. Livingstone. After having explored the western shore of Lake Nyassa, he started from about its centre in September, 1863, for the west, a period of the year too late to accomplish any great exploration. But he succeeded in determining one very important point—the position of the water-parting of the rivers flowing into Nyassa and those flowing westward.

Beyond the point attained by Dr. Livingstone no recent traveller has penetrated, but further to the westward several expeditions have passed from the Portuguese settlements on the Zambesi to within a very few miles of the probable southern end of the Tanganyika Lake. The chief of these are cited, not as novelties, for

they have been often quoted, but because the present moment invests them with a stronger interest.

A Portuguese colonist from Goa, Gonçalo Caetano Pereira, had sent from Tete more than one trading mission to the Cazembe prior to 1786, and in that year sent his son Manoel Pereira in charge of a mission to the same potentate. The accounts given by these enterprising men, as related by Dr. de Lacerda in his preliminary notes to the account of his expedition, contain many geographical features of importance to our present subject.

Manoel Caetano Pereira, the son, started in May, 1786, with his own slaves, and the Muizas who had brought down the Cazembe's ivory the year before, and after traversing the land of the Maravi—a term by which the great lake (Nyassa) was then known to geographers—was forty-five days in reaching the Aroangwa River, the stream whose head-waters were found by Dr. Livingstone in September, 1863, and then called the Loangwa or Zumbo—the latter name from the place where it falls into the Zambesi, 220 miles above Tete. In twenty days more he struck another river, called Zambeze, of which Dr. Lacerda says, "From the information of the people I venture to say that it is not our Zambeze or any of its influents from the Xire (Shiré) river upwards. The Zambeze of the Muizas flows to the *right* hand of those crossing it from Tete, and falls into other streams;" but he makes some confusion afterwards in the lakes into which it runs. "Manoel's party travelled thirty days from the river to the King's capital, crossed some deserts, and spent a day fording a lake waist-deep. This body of water is drained by *two* channels, one to the Zambeze, the other to the Murusura River, which passes the royal residence." What follows is almost unintelligible, at least with our present knowledge, but it is directly confirmatory of what Dr. Livingstone has heard so recently.

In the further expedition to the father of the Cazembe chief, Muata-Ya-Nvo, to the north-west, the route appears to cross some of the affluents of the Luapula River, which it could be demonstrated, as far as our imperfect knowledge goes, flows to the north-east and east.

The important mission of Dr. de Lacerda left Tete for the country of the Cazembe on July 3, 1798. The objects of this costly and noble undertaking were, as he tells us, to ascertain if Central Africa contains any mountain capable of sending forth the Cuñene River, which falls into the Atlantic a little below Cabo Negro, and to find a short and easy communication overland from Portugal to the Rios de Sena, and especially to seek the means of bringing these infidels

into the bosom of the Church. In the instructions which he issued to his officers, to be followed in case of his own death, he makes especial mention of the "Zambese," reported by the Pereiras, and directs that if it should flow to the right (that is, *eastward*) they would do well to descend it to ascertain whether it falls into the Shiré, but if to the left or westward, it may be the Cuñene, a river which Dr. de Lacerda had endeavoured, unsuccessfully, to explore in 1798; and then it is to be followed down to its mouth, and thence find their way to Benguella. The same method of proceeding is laid down with respect to the river flowing past the Cazembe's capital.

The expedition started, as before stated, on July 3, 1798, and reached the northern Aroangua River at the end of August; on the 30th they reached the Sorra Muchingua, which he named Antonina, in honour of the Prince, fixing astronomically a point about 70 miles south-eastward of it, Mazavamba, in latitude  $12^{\circ} 33'$ , longitude  $32^{\circ} 18' 15''$ . This very important position gives us a perfect clue to the course taken by the expedition, and the approximate position of the important Muchingua or Maxinga Range, probably a continuation of that seen by Dr. Livingstone north-west from Lake Nyassa, and which also may be the dividing range of the waters which flow toward the Zambesi on the south and those which pass through the Cazembe's country to the northward. Dr. de Lacerda afterwards speaks of the desolate and rugged country they traversed, and the cold they suffered from, which indicates a lofty region.

On September 10 they reached the northern Zambeze River, and here they made some geographical difficulty. Dr. de Lacerda says:—

"My principal desire being to obtain exact geographical notes of the size and the direction of all streams crossed between Tete and the Cazembe's country, and from the latter to Angola, I laboured to extract information from different Muize Caffres, and from Manoel Caetano Pereira, making repeated and compared inquiries to avoid errors arising from strange languages. All uniformly and repeatedly assured me that the Zambeze (Chambeze) and the Rugurue River ran to the RIGHT of one travelling to the Cazembe. Pereira confirmed this information, from which I infer that he does not know his right from his left hand."

Again:

"To-day (Sept. 11, 1798) I sent to inquire about the course of the Zambeze of sundry Mussucumos, a tribe mixed with the Muizas, some vassals of Cazembe (these were my informants) and others independent: *all* said that it trends to the river which runs by the city of the Cazembe,—whatever be the worth of their information, which at present I neither allow nor disallow."

Now nothing can be more circumstantial or direct than this information, that the rivers (which Gamitto says first flow to the

west) ultimately join that running northward past the Cazembe's city—the Luapula or Guapula River.

When this is connected with what is related by Dr. Livingstone, of the streams flowing westward from what is probably the westernmost spur of the great Maxinga Mountains, and which is further confirmed by the undeviating testimony obtained further north, it seems that it would be a perfectly fair inference to state that Dr. Livingstone had seen and crossed the head-waters of one or other of the streams which flow toward the Cazembe country.

The position of the crossing of this northern Zambeze by Dr. de Lacerda is well ascertained, for on September 21st, 1798, eleven days afterwards, he observed an immersion of Jupiter's first satellite, which gave him the longitude of  $30^{\circ} 1' 45''$  E.: this was in latitude  $10^{\circ} 20' 35''$ , and was his last astronomical observation. The place he calls Mouro Achinto, which Gamitto says was the name of the village chief. When Monteiro was here, October 15, 1831, it was called by the name Messire Chirumba.\*

Dr. de Lacerda's further journey to the Cazembe's capital is a narrative of his personal sufferings. He passed near to a great lake on his left hand (westward), which has been called Chama; but this was the name of the district (it is also called the Shuia Lake), and reached Lucenda, October 3, 1798, worn out with fever and anxiety.

The next travellers in this region who give any clear account of the country are Major José Manoel Correa Monteiro, as related by his companion Major A. C. P. Gamitto, who went on a mission to the capital of the Cazembe—Lunda or Lucenda—in 1831-2.† They started June 1, 1831, and followed the same general line of march described by Dr. de Lacerda.‡ On September 19th they crossed the Serra Muxinga,§ called by Dr. de Lacerda "Muchingua," and named by him the "Cordelheira Antonina." No estimate is given of its height; but it must be exceedingly lofty, for on the second day of their ascent they marched a league, continually ascending to the ridge of the mountain, where the pass was obstructed by an immense rock, like a portal to the defile. The direct route lay through a natural aperture,  $2\frac{1}{2}$  feet in diameter, in this rock, or else around it, over a terrible and dangerous precipice. This passed, they came upon a difficult and elevated desert country, where they suffered much from hunger.

On their return they reached the Serra Muxinga on August 10,

\* 'O Muata Cazembe,' p. 196.

† 'O Muata Cazembe, e os povos, &c., da Africa Austral.; Diario da Expedicao Portugueza commandada pelo Major Monteiro, e redigido pelo Major A. C. P. Gamitto. Lisbon, 1854.'

‡ 'O Muata Cazembe,' p. xviii.

§ Ibid., pp. 170-172.



1832, and give a longer account of it. It stands as it were alone, rising at once abruptly and very steeply from the table-land, but traverses an immense extent of country. It was estimated to reach an elevation above the sea of a league (Portuguese), or about 19,700 feet. Its head was nearly always enveloped in clouds, but no sign of snow or ice was visible or reported. The height, probably, is exaggerated, but Gamitto says that it is by much the most lofty summit in this part of Africa, and has precipices of a prodigious height. It commands most extensive prospects to the northward.\*

On October 9th they reached the River Chambezi, called by the natives Cono, a very rapid stream running to the west, but where afterwards no one knew; but Monteiro thought it might reach the Zambeze.† There is nothing, then, in their diary that militates against the results of the much more useful enquiries made by Dr. de Lacerda.

Without following our travellers further, or further alluding to the great lakes they passed, or that of Mofo near to the Cazembe capital, it may be accepted as a general conclusion, from their evidence, that the streams from the north-west of the Lake Nyassa, and northward of the mountainous desert which skirts the Serra Muxinga, run towards the lakes at the Lunda capital, and then, as far as report says, to the north-eastward.‡

To these testimonies we must add the more important one of Dr. Livingstone. As before quoted, he had taken great pains to ascertain from the travelled Babisa and Arabs as much as possible about the country in front.

"There could be no doubt that our informants had been in the country beyond the Cazembe's. The Lualaba is said to flow into the Luapula; and when, for the sake of testing the accuracy of the traveller, it was asserted that all the water of the region round the town of the Cazembe flowed into the Luambadzi, or Luambezi (Zambesi), they remarked, with a smile, 'He says the Loapula flows into the Zambesi—did you ever hear such nonsense?' or words to that effect. Their geographical opinions are now only stated without any further comment than that the itinerary given by the Arabs and others shows that the Luapula is twice crossed on the way to the Cazembe's; and we may add that we have never found any difficulty from the alleged incapacity of the negro to tell which way a river flows."§

Although it is a great trading highway with the Arabs and natives, no European traveller has passed north-eastward of the Cazembe's city.

To carry the argument that the waters flow north-eastward far-

\* 'O Muata Cazembe,' p. 402.

† Ibid., p. 447.

‡ See 'Proceedings Royal Geographical Society, 1864,' vol. vi. p. 262. Dr. Kirk confirms this—that the Loapula flows north into a small lake.

§ 'The Zambesi and its Tributaries,' pp. 532, 533.

ther, we derive some information from another region, that of Lake Tanganyika.

All recorded testimony acquired from the natives prior to the first East Africa expedition, and information given to Captain Burton, and every pains taken both by that traveller and Captain Speke, while in the country, only lead to one conclusion—that at the south end of Tanganyika Lake a river, the Runangwa or Marungu, runs *into* it; and it is only of late that any theory has made it run out, and so join the Nyassa Lake. There is nothing more certain known now of any particular of the great Tanganyika Lake than was acquired in the first and only visit made to it, in February to May, 1858; and as the geographical relation of this great and important body of water to African hydrology rests upon a single and very questionable observation, a few brief though well-known particulars are here cited.

The first East Africa expedition, sent out by the Royal Geographical Society in October, 1856, was organised and arranged by Captain Burton. He was joined by Captain Speke at Cairo, Nov., 1856, and finally left Zanzibar for the interior, June, 1857. This fine undertaking was most inadequately subsidized. Only 1000*l.* was supplied by the Government, through the Society; 750*l.* at the outset, and 250*l.* on their return. The rest of the total cost, 2500*l.*, was defrayed jointly by the travellers themselves.

It succeeded beyond expectation; and Mr. Findlay thought he was warranted in stating that there never was an expedition based on such limited means, traversing an entirely unknown country, through miseries and difficulties only then first ascertained, which brought to the knowledge of civilised man such a harvest of information on almost every branch of interest. The topography of Captain Speke is wonderfully perfect, considering his health and means of observation; and the 29th volume of the Society's Journal contains a masterpiece of descriptive geography.

They reached Ujiji, on the shore of the Tanganyika Lake, then seen for the first time, on February 18th, 1858. A single observation of Captain Speke, with what he described to Mr. Findlay as a "bath" thermometer, gave as the elevation of the lake 1844 feet. But this thermometer read 214° instead of 212°, when brought down to the East coast again. Captain Speke's second expedition will perhaps indicate when the index error, which subsequently increased to this great extent, became sensible. There was only one lunar observation taken for the longitude of Ujiji, which point determines the position of the lake, and this was discarded, and the position laid down from dead reckoning; but I believe that it cannot be far wrong. How energetically the intrepid travellers essayed, without

success, to reach the north end of the lake, and thus solve the great secret, has been often told. They had, however, seen what appeared to be the end of the lake, in lat.  $3^{\circ} 8' \text{ s.}$

The general character of Tanganyika Lake, as ascertained by observations and by hearsay, was as follows:—From Ujiji to the north end, as far as was seen, was about 100 geographic miles. Captain Burton estimated, from report, that it was 150 miles from Ujiji to the south end, making it 250 miles in length. Captain Speke's maps extend this considerably. His first map makes its south end 230 miles from Ujiji, terminating in lat.  $8^{\circ} 30' \text{ s.}$  His second map abridges this to lat.  $8^{\circ} 6'.$  His first published map reduces it to lat.  $7^{\circ} 45',$  like Captain Burton's estimate. This would be within 80 or 100 miles of Lucenda, the Cazembe capital.

It is evidently very deep, but no soundings could be taken. No mention is made, or evidence seen, of any change of level.

That an inland sea, of such magnitude, receiving the drainage of such a great extent of country, in a climate where the evaporation bears a large proportion to the rainfall, it is quite incredible that its waters should be FRESH. In the countless ages since its formation, it must have become saline, like the Dead Sea, as an extreme case, or the Caspian as another, or the Shirwa Lake of Dr. Livingstone, the deep waters of which are brackish, and taste like a weak solution of Epsom salts.

If this be granted, there are only three solutions to the problem. First, that it has an outlet to the Indian Ocean south of the route of the two East Africa expeditions; or, secondly, that some river runs to the westward, forming an affluent of the Congo, or other large Atlantic river; or, thirdly, that it drains northwards, to which argument these remarks tend.

In the first place, its outlet cannot run towards the Indian Ocean, to the northward of the parallel of its southern end, for that region was perfectly explored by Burton, Speke, and Grant. The Lufigi River, which debouches in lat.  $8^{\circ} 0' \text{ s.},$  has not been examined, but its known character will not admit of such a supposition. Its upper course, known as the Ruaha, traverses the upland desert only in the rainy season, and the space between its occasional sources and the south end of Tanganyika Lake is constantly traversed by the Arab caravans passing from Zanzibar towards Lucenda, for ivory, and Kitanda, or Kitata, south of the Cazembe's, for copper. These cross, or pass, a shallow morass or lake, the Rukwa lagoon, which, at times, joins the Tanganyika Lake. No river is crossed. The Ruaha, whose real sources are still unknown, is not passed. It cannot, then, run eastward.

The second alternative is, that it drains to the westward, or, in other words, that it either contains the source of the Congo, whose mouth is 1100 miles from the western shore of the lake, or that the waters flowing westward are finally absorbed by evaporation. To combat these views with the facts at command would lead far beyond the limits of this paper. Suffice it to say, that several routes to the westward of the Tanganyika not only negative this, but also would almost prove that the waters flow *into* the lake. The great distance will present now the most cogent argument against this; while we have the third, that the Rusizi River is an affluent.

The THIRD point is this northern outlet of the lake.

The additional knowledge we now have places this matter in a very different position from what it was in 1859, and the author averred that, if our late data be correct, there could be no other solution to the Nile question. He would name the difficulties as they have arisen.

After Burton and Speke had finished their exploration of Tanganyika, they returned, with means almost exhausted, to Kazeh; and here Captain Speke completed a rough outline of their route, and forwarded it to England, with a map, which shows that they conceived that the Tanganyika continued to a valley open to the N.N.W. Captain Speke, leaving Burton to prepare for their return march, then started for the northern, or Ukerewe, lake, July 9th, and on August 3rd observed it to be higher than Kazeh, or 3740 feet. This, also, was an imperfect result, from the defective thermometer. Returning to Kazeh, they collected the remnant of their property, and retraced their steps to the coast.

After having visited the Ukeréwe, or Victoria Nyanza, Captain Speke was firmly convinced that this was the true and *only* head of the Nile. That it is one of these reservoirs, no one can doubt. But in order to account for the supposed southern flow of the Ruzizi River, he drew a range of lofty mountains around the head of the lake, and between it and his own Lake Victoria, at a distance of 150 to 170 miles to the northward. These were purely hypothetical, as they were never seen or heard of.

The second East Africa expedition, under Captains Speke and Grant, went over precisely the same ground that the first had done, except where crossing the lofty coast ranges. Arrived at the upper plateau, we find that the thermometric observations in the second expedition, as compared with the first, give a lower elevation of about 350 feet to the country up to within 40 miles of Kazeh, their crucial station; but here the second elevations exceed the first by about 100 feet. It is probable, therefore, that hereabout the instruments in the first expedition began to fail.

It has been objected that these absolute and independent observations by the thermometer involve a fallacy, as the difference of level thus shown must be dependent on the varying pressure of the atmosphere: but to this may be replied that this region is so near to the equator, that the diurnal or secular variations of the barometer are nearly at a minimum, and that the whole range, except during cyclones or hurricanes, does not exceed a very few tenths of an inch in the mercurial column (each tenth of an inch representing 85 feet of elevation); and that all the observations relating to this point were taken under the same circumstances. Most certainly absolute accuracy must not be demanded for them; at best they can be but approximations.

Captain Speke made the elevation of the north side of his Victoria Nyanza (in his second expedition) to be 432 feet lower than in the first; and between this point and Gondokoro he made four other observations, to which Mr. Findlay wished to draw especial attention. The first is near Kamrasi's Palace (Luluga), 2856 feet; the second at the Karuma Falls, 2970 feet; the third, South Luluga, between Karuma Falls and Kamrasi's, 2906 feet; and Paira, 18 miles south of the junction of the Asua River, 1793 feet. (Sir Samuel Baker says that the Nile, issuing from the Albert Nyanza, is navigable as far as this, and therefore they are on the same level.) Finally, Gondokoro was made to be 1298 feet above the sea. Captain Speke's thermometers were not brought home, and therefore their index errors, which were probably considerable, could not now be ascertained. But they are all relative to each other, and one common correction would apply to all.

Captain Speke heard of the Great Lake, to the westward of Kamrasi's, since explored by Sir Samuel Baker, and named by him the Albert Nyanza. This lake was also reported to lie in almost the same position by Mr. Petherick, from information given to him by his man Mussaad, who went southward to within four days' march north-west of the north end of the lake. It was also announced by Dr. Peney, May 20th, 1861.

In addition to this lake, Captain Speke places another, the Rusizi Lake, at the distance of 110 miles due north of the north extremity of the Tanganyika Lake, and connects them by the Rusizi River, which passes through Uzige country. This Rusizi Lake therefore lies in the heart of the mountains he inferred to exist in 1858.

The names Ujiji, Rusizi, Uzige, N'zige, which are placed on this line by Captain Speke, have a great resemblance to each other.

Mr. Consul Petherick reached Gondokoro, Feb. 20th, 1863, and made the elevation by thermometer B. P. (three observations) 1265

feet, a remarkable coincidence with those of Captain Speke's—they are identical.\*

Mr. Petherick gave a similar thermometer to Sir Samuel Baker, who had arrived at Gondokoro a few days previously; and this also has been returned and tested,† so that its error, and the application of the difference, is not only available for its own results, but will also test and correct those which can be directly connected with it.

Sir Samuel Baker and his lady ascended the rivers on the track which had been descended by Captains Speke and Grant; and, with this thermometer of Mr. Casella's, he observed the altitude at the four places mentioned above as having been observed by Captain Speke. For the sake of comparison they are placed (with Gondokoro) in juxtaposition below; those of Captains Speke and Grant being uncorrected, and those of Sir Samuel Baker with the final corrections determined on at Kew.

|                       | SPEKE.   |                    | SIR S. BAKER. | Difference. |
|-----------------------|----------|--------------------|---------------|-------------|
| Luluga (Kamrasi's) .. | 2856 ft. | Mrooli (do.) ..    | 4061 ft.      | 1205 ft.    |
| Karuma Falls .. ..    | 2970     | .. ..              | 3966          | 1026        |
| S. Luluga .. ..       | 2906     | .. ..              | 4056          | 1150        |
| Paira .. ..           | 1793     | (R. Nile, near) .. | 2720          | 927         |
| Gondokoro .. ..       | 1298     | .. ..              | 1999          | 701         |

Mean of the five differences, 1002 ft.

We have thus a clear difference between Captain Speke and Sir Samuel Baker of 1000 feet, at nearly, or quite, the same places. This may seem to be a very large proportion of the entire elevations; but it should be remembered that even in the last one, Gondokoro, it has been thought necessary to add 700 feet to the result obtained by Mr. Petherick with the same instrument.

This difference of 1000 feet must therefore be either *subtracted* from Sir S. Baker's elevations or *added* to Captain Speke's; one or the other will prove the point Mr. Findlay wished here to insist on.

Not only would this correction regulate the observations made in Captain Speke's second expedition, but it would apply to those made in the first, as the second passed over the same ground.

It has been said above that the second expedition made Kazeh 92 feet, as a mean, higher than did the first. Therefore the observation at Tanganyika must also be brought in, as it was made by the same instrument, placing it at 1844 feet.

Now, as Captain Speke's measurements throughout are consistent with each other, if we accept them as correct, it is perfectly possible

\* Mr. Petherick's observations are given in the 'Journal Royal Geographical Society,' 1865, vol. xxxv., p. 300.

† See 'Journal Royal Geographical Society,' 1866, vol. xxxvi., p. 16, where Sir S. Baker's observations are computed and investigated by Mr. Dunkin.

for Tanganyika Lake at 1844 feet to flow into Gondokoro at 1298 feet, past Paira at 1793 feet elevation.

But then, Sir Samuel Baker makes the Albert Nyanza to be elevated 2720 feet. If we take Captain Speke's observations as correct, this must be *reduced* to 1720 feet, identical with Captain Speke's observations at Paira, nearly or quite on the lake level; or, what is much more reasonable, we must apply the known correction by Sir S. Baker's thermometer to Captain Speke's observation, acknowledged to be imperfect; this will bring Tanganyika Lake up to 2844 feet, or 124 FEET ABOVE THE ALBERT NYANZA.

Either of these views will quite determine the question as to the POSSIBILITY of Lake Tanganyika being connected with the Albert Nyanza.

Without claiming for these hypsometrical observations any refinement—they can be but simple approximations—and putting aside minor differences, it might be broadly stated that these two great western lakes *are on the same level*.

As to the geographical position of the lakes, this is most simply met.

Captain Speke heard, in 1861-2, of a lake, the Rusizi, due north of the Tanganyika Lake, and lying between latitudes  $1^{\circ}$  and  $2^{\circ}$  s., westward of the lofty Mfumbiro Peak.

Sir Samuel Baker sailed down the north-eastern side of the lake, past its abrupt cliffs of granite and gneiss, rising abruptly from the water to 1200 and 1500 feet high, and heard from King Kamrasi and many natives that it was well known as far as between latitudes  $1^{\circ}$  and  $2^{\circ}$  s., when it turns to the westward, the extent being unknown even to Rumanika, king of Karagwé.

This enormous lake, thus at least 260 miles in length, embosomed in lofty mountains on either hand, extends to and covers the site of the Rusizi Lake heard of by Captain Speke, and passes over his mountains of 1858.

Who, then, can doubt, if the data we possess be worth anything, but that *they are one and the same lake*?

The author therefore claims for Lake Tanganyika, as he did in 1859, when he stood alone, the honour of being the SOUTHERNMOST RESERVOIR OF THE NILE, until some more positive evidence, by actual observation, shall otherwise determine it.

Dr. Livingstone, by determining the division of the water-flow to the westward of his Nyassa Lake, in September, 1863, had, therefore, probably reached some of those occasional streamlets which feed the Nile.

The true sources of the Nile must be looked for in the mountains west and north-west of the Nyassa Lake, or in the great Serra

Muchinga of the Portuguese travellers, between latitudes  $11^{\circ}$  and  $12^{\circ}$  south. Thus adding 600 miles to the known course of that wonderful river, to which each new discovery adds a new interest.\*

The paper will be published verbatim in the Journal, vol. xxxvii.

The PRESIDENT said he was sure every geographer would appreciate the ability, ingenuity, and pains which Mr. Findlay had displayed in this paper, which collated all the notices we had of the interior of Africa, whether drawn from Portuguese records or the discoveries made by our own countrymen. Mr. Findlay had got over the difficulty, as he thought most satisfactorily, of the supposed lower level of the Lake Tanganyika, upon which the whole question rested. Mr. Findlay had collated the observations made independently by Captain Speke on the one hand, and by Sir Samuel Baker on the other, at exactly the same points, and had found that they differed, on an average, by 1000 feet. Arguing from this difference, and diminishing or augmenting the height, he inferred it was extremely probable that the Lake Tanganyika might be 1000 feet above the level it was supposed to occupy, or Albert Nyanza 1000 feet lower. He agreed with Mr. Findlay that Dr. Livingstone had completely settled the question of Lake Nyassa having not only no northern outlet, but being really fed from the north. Before calling for any observations on the paper, it was his duty to state, with reference to Livingstone's travels, that two of the gentlemen were present out of the four who were going out in the expedition of search—Mr. Young, the leader, and Mr. Faulkner, as a volunteer at his own cost. These gentlemen were to sail on the 10th inst.; and, as they were about to depart so soon, he begged to introduce them to the meeting.

Mr. YOUNG said he would endeavour to explain what the expedition under his command intended to do. In the first place, they would sail from England in the Cape Mail steamer, taking with them the steel boat, provisions, and barter-goods for the journey. When they arrived at the Cape, one of our cruisers would transport them to the mouth of the Zambesi. The boat—which was made to take to pieces in sections, weighing 47 lbs. each—would then be put together; and in it they would proceed up the Zambesi to the Shiré, then up that river until they arrived at the Murchison Cataracts. Here the boat would be again taken to pieces, and carried past the cataracts to the Upper Shiré, and there screwed together again. From that point they would be able to proceed the whole of the way by water to the north end of Lake Nyassa, to within 50 miles of where Livingstone was supposed to have been murdered. For his part, he did not believe the report of Moosa, the Johanna man, who had been under him nearly two years on the Zambesi, and had shown himself to be totally untruthful.

Mr. FERNERICK said if Sir Samuel Baker's altitudes were to be adopted with regard to the Albert Nyanza, and the former observations of Captain Speke were to be corrected and brought into unison with them, in consequence of the inferior kind of instrument he employed, the statements of Mr. Findlay make the altitude of the Tanganyika sufficient to connect it with the Albert Nyanza. But in that case the connection of Victoria Nyanza with the Albert would

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\* The length of the Nile's course from Gondokoro to its mouth, following its major windings, is about 2400 geographic miles (or 2780 British miles). From Gondokoro, near to which, it was generally argued, ten years ago, that the southernmost head of the Nile would be found to the south end of Tanganyika Lake, is 830 geographic miles (or 960 British miles). If the source be near the Muxinga Range, it must be 270 geographic miles (or 312 British miles) still further south, so that its total course will be 3500 geographic, or 4050 British miles, —almost unparalleled by any other river.



seem very doubtful; for how could the Somerset River fall into the Albert Nyanza, which would be raised 700 or 800 feet above it? He would ask the meeting to recollect that the only actual measurements of the volumes of water of the Nile Rivers ever sent to this country were made by himself in 1863; such measurements were of the highest importance in discovering the lake origin of the Nile and its tributaries. His observations showed these results:—In latitude  $9^{\circ}$  N. nearly, at the mouth of the Bahr-el-Ghazal, the volume of water poured by the Ghazal into the Nile measured 3000 cubic feet per minute; while that conveyed, by the Nile itself, independently of the Bahr-el-Ghazal, was in round numbers 8000 cubic feet per minute. It was a common Rule of Three sum,—if it took a tract of country embracing between  $5^{\circ}$  and  $6^{\circ}$  of latitude to furnish 3000 cubic feet of water per minute to the Nile, how many degrees of latitude would it take to furnish three times that amount? The problem would show that the conclusions of Mr. Findlay, arrived at two thousand years ago by Ptolemy, were not exaggerated, and that the flow of water coming down into the Nile might reasonably be expected to come the distance that had been stated. Another observation to be deduced from Mr. Findlay's altitudes, would prove the improbability of the connection of the Victoria Nyanza with the Albert Nyanza. Independently of the 8000 cubic feet per minute conveyed by the Nile itself at  $9^{\circ}$  N., and the 3000 conveyed by the Bahr-el-Ghazal, the Sobat affluent conveyed nearly 9000 cubic feet per minute, a greater volume of water than the Nile itself. Therefore, he would throw out this suggestion, that the Sobat might really be the river that issued from the Victoria Nyanza, as the Nile itself was derived from the Albert. The Sobat might fairly be supposed to have its source nearly as far south as the White Nile. With respect to the search expedition which was about to set sail, he entirely coincided with the President in disbelieving the report of Livingstone's death. Any man who had had a long experience of the negroes of those districts would detect a falsehood on the very face of the story that Moosa had told. It was too circumstantial for a true account. His statement that after the fight he returned with his companions several hours afterwards and found the bodies of Livingstone and three or four of his companions on the ground unmolested, was so unlike the usual mode of proceeding of these people, that it could not be correct. Every African traveller knows that the trophy most prized by savages, such as the Mavite, would be a portion of the body of the enemy they had slain; and if the poor Doctor had fallen, his body would have been cut up into as many pieces as there were savages to be gratified. It was, he thought, to be deeply regretted that the object of the expedition, now about to leave England, was merely to ascertain the certainty of the fate of Dr. Livingstone, and was on so small a scale as to preclude it from the possibility of affording the illustrious traveller, should he be in life, that relief of which he must be in need. Mr. Petherick had been in his late journey in a similar strait, and had he not most fortunately obtained supplies from one of his trading stations, he and his entire party must have succumbed.

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2. *On the Map of Africa published in Pigafetta's 'Kingdom of Congo,' in 1591.* By R. H. MAJOR, Esq., Secretary, Royal Geographical Society.

It is the usual practice at our meetings to lay before the Society some substantive fact in the shape of real recent exploration, which may extend our geographical knowledge. Such is not the case this evening. Mr. Findlay's observations have, from the nature of the

case, been, of necessity, merely inferential; but I think the high importance of the subject treated of is a sufficient reason for occupying your attention even with inferences, especially when derived from such sound premises as Mr. Findlay has adduced. But it is clear that inferential reasoning needs all the confirmation it can procure; and I propose to lay before you, in corroboration of Mr. Findlay's conclusions, information gathered by the Portuguese in Africa 300 years ago, and recorded on a map made to illustrate a printed book, in which also the amount of information which had been collected is given in detail. I allude to the account of the kingdom of Congo, printed in Italian, at Rome, by Felipe Pigafetta, in 1591, but describing observations made in Africa by Duarte Lopes, a Portuguese, from 1578 to 1587; at which time his countrymen were well established in that country.

This work, as you may suppose, has not escaped the diligent research of our learned Fellow, Mr. Desborough Cooley, who, as early as 1845, called attention to it in a Paper which is in your own possession in the 'Journal' of our Society for that year. At that time, however, the great lakes Victoria Nyanza and Albert Nyanza had not been discovered; and when I state that the old map, of which I am about to speak, contains those two lakes lying very nearly in their right position on the Equator, with another great lake due south of that which answers to the Albert Nyanza, it is obvious that we are enabled to view this map in another and a clearer light than Mr. Cooley at that time had the advantage of. The single fact of the Map exhibiting, as none of its predecessors or successors had done, these three important lakes so recently discovered, would, I think, be sufficient to justify my commending the map to your attention as one from which we may reasonably hope for enlightenment on points which have not yet been established by satisfactory modern observation. But I need not confine my recommendation of the map to this one fact, for vague and strange as its delineation will appear from this enlarged diagram to your eyes who are accustomed to neater and more systematic cartography, it contains several other items of information which I can point out as wanting in subsequent maps, until they had become matters of fact substantiated by recent explorations.

To begin at the north, it is not improbable that in the Lago Chinanda we have Clapperton's Lake Chad, although considerably north of the true position, and the Lago de Nubia may well be the Liba Lake; but of these I speak with much hesitation. I can, with far greater confidence, call your attention to the fact that on this map for the first time is laid down the great empire of Monomoezi, or Uniamuezi, occupying in a remarkably striking manner a position

between the easternmost of the two equatorial lakes and another vast lake to the south-west, exactly corresponding with the true position of that country between the Victoria Nyanza and Lake Tanganyika. But there are other items of approximate coincidence which, I think, deserve your attention. In the north-east you have the Lago Barcena corresponding with Lake Dembea, with an affluent of the White Nile issuing from it,—a fact by no means unworthy of notice, even though the indistinctness of the delineation leaves us in doubt whether the Atbara or Bar-el-Azreh may be intended.

Nor is it without significance that north-westward of the Lake Colue, which answers to the Victoria Nyanza, there occurs the word Barimboa, closely expressing Baringo, the name of the water north-west of that great lake.

If we travel further south, we find near to each other the names of Matemba and Quimbebe, suggestive of an indistinct piece of information respecting Kabebe, the court of the great Sovereign of Matiamvo, to whom the King of Casembe was a tributary. Yet further south, on the Tropic of Capricorn, we find the word Butua representing on its proper position the country of the Bechuanas. These various points, I submit, indicate a sufficient amount of approximately correct information, as established by recent exploration, to justify us in inquiring what further the author of the map can tell us with reference to the important subject of this evening. Unhappily we get not the slightest recognition of two great lakes south of these on the Equator. One only is spoken of, and I propose to show that the two great lakes of Tanganyika and Livingstone's Nyanza have been confused into one, doubtless through the information being procured from various sources. The following is the statement in the work which the map was made to illustrate:—

“The Nile does not rise in the country of Bel Gian, *i. e.* Prester John (the Emperor of Abyssinia), nor in the Mountains of the Moon, nor, as Ptolemy writes, from two lakes lying in east and west, with about 450 miles between them. For in the latitude in which he places these two lakes lies the kingdom of Congo and Angola on the west; and on the east are the empire of Monomotapa and the kingdom of Sofala, the distance from sea to sea being 1200 miles. In this region Lopez stated that there was only one lake, on the confines of Angola and Monomotapa. It is 195 miles in diameter, as he learned from the people of Angola on the west, and those of Sofala and Monomotapa on the east; and while they give us a full account of this, they mention no other lakes, whence we may conclude that there is no other in that latitude. It is true that there are two lakes, not lying east and west, but north and south of each other, and about 400 miles apart. Some of the natives think that the Nile, issuing from the first lake, flows underground and again appears; but Lopez denied this. The first lake is in 12° s. lat., and like a shell, and surrounded by very lofty mountains, the highest of which on the east

are called Cafates, and on both sides are mountains from which saltpetre and silver are dug. The Nile flows thence 400 miles due north, and enters another very great lake, which the natives call a sea. It is larger than the first, for it is 220 miles across, and lies under the equinoctial line. Respecting this lake very certain information is given by the Anzichi, near Congo. They say that there are people on it who sail in great ships, and who write, and have weights and measures, such as they have not in Congo. Their houses were built of stone and lime, and equalled those of the Portuguese, whence it might be inferred that Prester John was not far off. From this second lake the Nile flows 700 miles to the island of Meroe, and receives other rivers, the principal of which is the River Colnes, so named because it issues from a lake of that name on the borders of Melinde, and when the Nile reaches Meroe it divides into two branches, and embraces a high land named Meroe, to the right of which, on the east, is a river named Abagni that rises in the Lake Bracina and crosses the empire of Prester John till it reaches that island."

Now if there be any value in this statement at all, coinciding as it does with considerable accuracy with what we now know of the relative positions of the two Equatorial lakes and Tanganyika, it is impossible to avoid identifying the latter lake with that here described as the headwater of the Nile, which is the main point to which I wished to call your attention in confirmation of Mr. Findlay's conclusions. At the same time, the latitude of  $12^{\circ}$  s. and the placing the lake described on the confines of Angola and Monomotapa plainly indicates the Lake Nyassa of Livingstone; but I submit that it is quite possible for a certain amount of accurate information to have been derived from the natives with respect to both these lakes; but that, from want of completeness in the information, confusion has easily arisen.

I would beg leave further to add a point of interesting antiquarian information respecting Livingstone's Lake Nyassa and the River Shiré. The Father Manoel Godinho, in his work entitled 'A Voyage from India to Portugal by Land in 1663,' says,

"The way from Angola to India by land is not yet discovered; but it will not fail to be easily learnt, for from Angola to the Lake Zachaf in the interior of Ethiopia (which is 15 leagues broad, but its length is not known), the distance is less than 250 leagues. Cosmographers place this lake in  $15^{\circ} 50'$ , and according to a map which I have seen, and which was made by a Portuguese, who travelled for many years in Monomotapa, Manica, Butua, and other kingdoms of Caffraria, this lake is not far from Zimbaú, which is the court of Mesura, or Marabia. From it issues the River Arumi, which falls into the Zambezi above our fort of Tete, and also the River Chire, which traverses many lands, and ultimately those of Rondo, and falls into the Cuama (the old name for the lower portion of the Zambezi) below Sena. With this prelude I now assert that whoever proposes to travel from Angola to Mozambique, and so to India, crossing the interior of Caffraria, must make for this Lake Zachaf, and descend by the rivers to our forts of Tete and Sena, and thence to the bar of Quilimane. The existence of this lake is asserted not only by the Caffres, but by Portuguese who have visited it and sailed on the rivers. We have not as yet found any inducement to explore the road of which I have been speaking."

It is needless to say that Lake Zachaf is identical with Livingstone's Nyassa. Should our illustrious Livingstone have succeeded in making his way to the court of the Casembe, it is to be hoped that the chief who reigned in 1831 and 1832, when Monteiro and Gamitto were there, may have gone to his rest and been followed by a more worthy successor. Fortunately for these explorers they had been preceded at the close of last century, as you have already heard, by their countryman Lacerda, who had been treated by the previous king with much kindness. Reverence for their ancestors is a matter of religion among the Cazembe, and Gamitto's party would in all probability never have escaped from the clutches of the Muata or chief, had not the latter been persecuted in his dreams by the ghost of his father, who complained that Lacerda's spirit was constantly remonstrating with him on account of the detention of his fellow-countrymen.

The PRESIDENT, in returning the thanks of the Society to Mr. Major, said his paper corroborated to a considerable extent the ingenious suggestions of Mr. Findlay, drawn as the information was from sources of greater antiquity. Though the different lakes, as placed in the old map, were not in precisely the same position they are now known to occupy, yet the main fact of a great body of water flowing so far from the south to the north and supplying these lakes was a remarkable confirmation of the truth of recent discoveries. There were few persons among them so well acquainted as Mr. Major with the history and progress of geography.

Mr. FINDLAY said, with reference to Mr. Petherick's remarks, if Captain Speke's ~~statement~~ <sup>theory</sup> was to be corrected by Baker's, the result would be to raise the ~~level~~ <sup>level</sup> sufficiently for it to flow, not up-hill, but in the way Sir Samuel Baker pointed out. Although Captain Speke had made the river to issue from the Victoria Lake, it was manifestly impossible that he could ever have seen the lake at that point, owing to the conformation of the land at Ripon Falls. There might have been another lake in this part. It was a fair subject for doubt whether such a lake as the Victoria Nyanza existed in the form described. It was possible there might be several lakes. The quantity of water passing from the Sobat was too large to account for its known area of drainage. It was a considerable affluent with a very small basin. In fact, there were still many difficulties with regard to the Nile, and he hoped Livingstone would yet be found living and able to clear them all up. At present, with the data before us, it was impossible to escape from the conclusion at which he had arrived.

The PRESIDENT said, in the absence of Sir Samuel Baker, he might communicate his views with respect to the best method of settling this great question of the ultimate watershed of the Nile. His recommendation was that the Pasha of Egypt should be persuaded to undertake an expedition, with a view to the annexation of the banks of the White Nile and the Equatorial Lakes to Egypt; to send detachments of armed men, forming a force of which Sir Samuel Baker would be happy to take the direction. The subject would, probably, sooner or later, be brought under their consideration by Sir Samuel Baker himself.

Mr. BAINES, in reference to the doubts recently expressed, that the Zulu Kafirs could have passed across the Zambesi from Natal, said the Zulus were originally a very small tribe, but had become a very large one by the amalgamation of a great number of other tribes under the chief Chaka or "Battle-axe."

This powerful chief took from them all their weapons, leaving only a shield and one spear, and the man who went into action and lost his spear was bound to bring away that of a dead enemy, or lose his life. When a party was sent out on an expedition, if they failed they dare not return, for the penalty was death. Mōsélekátsé himself went out once, and, failing in his object, he migrated northward, instead of returning to his tribe. It was he who inflicted such deadly injuries on the Boers, who had been obliged to leave the Orange Colony in consequence of the depredations committed on them by the J. . . . K. . . . Mōsélekátsé, in course of time, moved further and further northward, and he was now established in the Matabele country. This party of Zulus were originally five or six hundred strong; and they scoured the whole country, murdering every man and woman, and taking prisoners the boys, whom they brought up among their own tribe. Other Zulus had broken off from the main body in the same way as the Matabele, and had gone still further to the north. When he (Mr. Baines) was on the Zambesi, with the Livingstone expedition, a party of these Zulus had come northward, and were offering their services to the Portuguese in the war then being carried on with the natives. Now, if these people could advance as far as the Zambesi, he saw no difficulty in other tribes of Zulus, who had preceded them some years, passing through the country to the north-western shore of Lake Nyassa.

Mr. WALLER thought it was just to state to an assemblage who felt so much interest in the fate of Livingstone, that letters had arrived from Zanzibar that day, by which it appeared that doubts prevailed in that place as to the story of the Doctor's death. A letter from Mr. Alington assured him that he had the gravest doubt as to the truth of the story set afloat by Moosa, who had told different stories to the Arabs in Zanzibar from that he had given our Consul. This was important, because we knew from Colonel Rigby, who had returned from Bombay, that Moosa had told a different story to the sepoys, and it was quite by accident that Colonel Rigby took the depositions of these men. It was a satisfaction to find that doubts regarding this story prevailed not only here and in India, but at Zanzibar itself.

The PRESIDENT, in conclusion, said he could not but feel intense gratification at hearing the opinions that had been expressed with regard to the probability of Livingstone being still alive. At a former meeting he almost stood alone. With the exception of Captain Sherard Osborn, he had scarcely anybody to support him in the doubts he then expressed. He relied upon Mr. Young, a gentleman who knew this man Moosa well, and who knew the character of these fellows, that they were great liars, and never to be depended upon. He had still a well-founded hope that his friend Livingstone was yet pursuing his adventurous journey into Central Africa, there to settle definitively the great problem on which Mr. Findlay had thrown so much light by his able investigations.

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*Fourteenth Meeting, 24th June, 1867.*

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in the Chair.

PRESENTATIONS.—*H. A. Glass, Esq.; E. T. Higgins, Esq.*

ELECTIONS.—*C. J. Bayley, Esq., C.B. (late Governor of the Bahamas); Frederick Addington Goodenough, Esq. (of Calcutta); Nathaniel Plant, Esq.; General Sir George Moyle Sherer; the Hon. Richard Gilbert Talbot.*

ACCESSIONS TO LIBRARY FROM JUNE 3RD TO 24TH. *Donations.*—‘A new Theory of the Cause of Tides.’ Presented by the Author, J. Culbertson. ‘Die Gestalt der Erde und der Meeresfläche und die Erosion des Meeresbodens.’ By von Bischof. Purchased. ‘Description of a new Double Sextant.’ By Capt. George, R.N. ‘Remarks on Dr. Livingstone’s Last Journey.’ By Alex. George Findlay, Esq. ‘Dynamical Theory of the true figure of the Earth.’ By F. C. Bakewell. ‘Humboldt: Correspondance scientifique et litteraire, precedé d’une Notice et d’une Introduction par M. de la Roquette.’ Donor, the President. ‘Die Nikobaren: zur Colonisation dieser Inseln durch Preussen.’ Franz Maurer. With 4 maps. Berlin, 1867. Purchased. ‘Reise der Oesterreichischen Fregatte *Novara* um der Erde.’ (Linguistic, vol. i.) Dr. F. Müller, Vienna. ‘Five Years in Japan.’ By van Meerdevoort. Purchased. ‘Obras Publicas do Brazil.’ 3 vols., including many Geographical Papers, particularly relating to the Rivers Amazons, Madeira, Purus, Araguaya, etc.’ Presented by T. Whitfield, Esq. ‘Notice sur l’Hypsomètre de la Suisse et l’Orographie des Alpes.’ By J. M. Ziegler. Translated by P. Bourrit. ‘Papers relating to the aboriginal Tribes of the Central Provinces of India.’ By Rev. S. Hilsop. Donor, Sir Stafford Northcote. ‘The Free Indian Tribes of Central America.’ By F. Boyle, Esq. ‘Berichte ueber die Biologisch-Geographischen Untersuchungen in der Kaukasus Landern.’ By Gustav Radde, Tiflis. Donor, the Author. ‘Nivellement de precision de la Suisse.’ By A. Hirsch et E. Plantamour. ‘Synopsis of Star-fish in British Museum.’ By Dr. Gray. Presented by the Author. ‘Sketches of Japanese Manners and Customs.’ By J. M. Silver, R.M.—with facsimile pictures of native artists by Day and Son. Presented by Alfred Davis, Esq. ‘Frobisher’s Three Voyages.’ Donors, the Hakluyt Society. ‘Grönland und die Grönlander.’ By Henrick Helms. Purchased.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING OF 3RD JUNE, 1867.—Admiralty Chart of Middleton reef, South Pacific Ocean. Surveyed by Sir H. M. Denham, C.B. H.M.S. ‘Herald,’ Chromolithographed. Presented by the Hydrographical Office, Admiralty.

Before the reading of the Papers, the President announced that the young Prince who sat upon his right hand was his Imperial Highness the Duc de Leuchtenberg, an ardent mineralogist, and already President of the Imperial Mineralogical Society of St. Petersburg. It gave him (the President) sincere satisfaction, after the kind and hospitable reception he had met with in former years in Russia, to be honoured by the presence of a member of the Imperial family, who was so sincere a lover and promoter of science.

This sentiment having been cheered by the Assembly, his Imperial Highness returned thanks, in English, for the notice taken of him, and spoke in

warm terms of the benefits conferred upon his country by the geological labours of Sir Roderick Murchison, and for which the Russians were truly grateful.

The following Papers were then read :—

1. *Notes on the Russian Harbours of Possiette, Wladivostock, Nakhodka, and Olga Bay, on the Coast of Manchuria.* By the Rev. W. V.

LLOYD, R.N., F.R.G.S.

THE author visited the Russian settlements on the coast of Manchuria in the summer of 1866, when he was serving as chaplain on board H.M.S. 'Scylla,' Capt. Courtenay. The vessel left Nagasaki, in Japan, on the 20th of July, and arrived at Possiette (now called Novogorodski) on the 25th. The general aspect of the country was dreary, being hilly and destitute of timber; a dozen log-houses marked the site of the Russian settlement. Russia has found here what she has long coveted, a harbour where her fleets can pass in and out during the winter season; perfectly sheltered by surrounding hills, with deep water, an impregnable position, and a good supply of coal on the spot. The Tu-men River, the boundary between the newly-acquired Russian territory and Korea, runs within 30 miles of the settlement. The Chinese or Manchu town of Hun-chun is situated 25 miles above its mouth, and contains a population of from 6000 to 10,000. Russia has taken complete military possession of the coast, as well as of the Khinka Lake, in the interior, and the right bank of the Usuri River, a branch of which flows out of the lake, and is navigable down to the Amur. Drafts of regiments or of sailors are established every ten miles, and the men are diligently employed in making the great military road, which is to connect the coast settlements with the Amur. A telegraphic line was expected soon to be laid between Novogorodski and the Amur, between which and St. Petersburg there is already telegraphic communication. The protection of a Russian garrison had induced more than 300 families of Koreans to establish themselves within the Russian frontier.

The next settlement to the north of Novogorodski is Wladivostock, or Port May. The thermometer here, in January to March, sometimes descends as low as  $-15^{\circ}$  to  $-20^{\circ}$  Fahr., and the harbour is closed up by ice during those months. The land is of excellent quality, and moderately covered with timber. With the exception of seven foreign merchants, the settlement may be said to be purely military, like Novogorodski; but it is more flourishing, and it derives great importance from being the nearest coast station to the head of navigation on the Usuri River, which will form the principal means of communication with Eastern Siberia, owing to



the lower part of the Amur, further northward, being frozen up during several months of the year. The nearest practicable route from Wladivostock to the point where steam navigation on the Usuri commences is 200 miles. The River Suifun, at the head of Guérin Gulf, a distance of about 20 miles from the settlement, is navigable for good-sized boats to within 40 miles of the Lefu River, which flows northerly towards the Usuri, and empties itself into the Khinka Lake. A small steamer was soon expected to ply upon the Lefu. A thorough official survey was made of this important line of communication, in 1859, under the direction of Colonel Budogorsky. The length of the Usuri, which is the most important southern tributary of the Amur next to the Sungari, is 497 miles. Lake Khinka is about 60 miles long by 40 wide, and its banks are now dotted with Cossack settlements.

This paper will be published *in extenso* in the 'Journal,' vol. xxxvii.

The PRESIDENT said the paper was a popular sketch of the present condition of the Russian settlements in Manchuria, part of the information being derived, as stated by the author, from Russian sources. He was glad that Mr. Lloyd bore testimony to the readiness with which Russian officials communicated information respecting the geography and productions of the countries they occupied.

Captain SHERARD OSBORN said that, in listening to the paper, he was impressed with the great fact that the Russian inhabitants and Government in Siberia were struggling with enormous difficulties in their endeavours to obtain access to the eastern seas and a more genial climate. This desire was a very natural and legitimate one. The great population of Siberia, extending from Orenburg to the mouth of the Amur, had to contend with serious physical difficulties in obtaining easy communication with the east and south. The harbours on the eastern coast were frozen up for a considerable portion of the winter. He had himself seen ice two feet in thickness in the bay, and, if he remembered rightly, ice was the first article of export from Russian Manchuria. Englishmen ought to be the first to lend a helping hand to these northern settlers who were struggling with the difficulties of such a climate, and to encourage them to find a better outlet than they had at present to those tropical regions of Asia, where alone could be found the products necessary for the wants, comforts, and luxuries of European existence. The fact that telegraphic lines were being extended from the Amur to Lake Khinka was well worthy of attention. It was remarkable that the telegraph and the highway—those two great desiderata to the importance of which the English Government were only just awakening in British India—were actually established in advance of immigration in this new Russian territory; and it did great credit to the Russian Government that they should so early appreciate their importance to the settlers struggling with so severe a climate.

Mr. SAUNDERS observed, that many of the rivers named in the old Jesuit maps of the shores of Chinese Tartary appeared to have escaped the notice of the English, French, and Russian marine surveyors, who had made charts of those coasts in our time. One of those rivers, the Tourho, was alluded to in the first accounts received here of the Russian acquisitions on the Usuri; and it was only to be found on the Jesuit maps. He hoped that attention would be paid to those old maps in future surveys.

The PRESIDENT said, it was always the practice of Russian geographers to

retain the names used in the countries they explored. Thus, the Jaxartes of the ancients was the Syr Daria of the Russians, and the Oxus of the ancients their Amu Daria.

The Rev. Mr. LLOYD said that the Russian navy and surveyors had gone very regularly over that portion of the coast which Mr. Saunders had referred to; and the Master of the *Scylla* was much indebted to the Russian officers while on his visit there, not only for the information they gave, but also for the admirably executed maps which they allowed him to see. A mistake in the English charts was detected and made good by comparison with the Russian charts. The Russian determinations had been made with great accuracy.

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2. *On Communication between India and China by the line of the Burhampooter and Yang-tse.* By General Sir ARTHUR COTTON, R.E.

THE Author stated that orders had been lately issued to survey the line of country in Lower Burmah or Pegu as far as our own frontier, in the direction of the Chinese province of Yunan, with a view to the establishment of a line of route between our Indian possessions and China; but he thought it very strange that so important a question as internal communication between India and China, should be treated in such an imperfect way. No attempt had been made to consider the real question, which was, what would be the best line for such a communication. He conceived the question of throwing open all India, with its population of 200 millions, to all China and its 400 millions of people, was of such great importance that it required a much more serious consideration than had yet been given to it. There were three conclusive objections to the connection with Rangoon. 1st. It would lead the traffic to an insignificant port, instead of directing it to the great port of India and the seat of Government. 2nd. It would not connect the great body of India with China, but only an insignificant province containing two millions of people. 3rd. There were 900 miles of land-carriage between Rangoon and the Yang-tse; whereas it was essential to approach much nearer the great line of water-carriage in China, by which all the great traffic of the country was carried on.

The line which best fulfilled the necessary conditions of the shortest possible land-carriage was the direct one between the Burhampooter and the Yang-tse, the distance between the navigable parts of which was only about 250 miles. This was the only interruption in a prospective line of internal water-communication between Kurrachee and the whole interior and seaboard of China, for the Indus and the Ganges would be sooner or later connected by means of a canal between the Sutlej and the Jumna. The line thus suggested had the advantage of being not only the shortest,

but also that which would connect the heart of China with that of India, and would not require to be led through any foreign intermediate country, as was the case with the southerly line through Burmah. The great superiority of water over land transit for extensive trade was pointed out by the author, especially in countries where the distances were computed by hundreds of miles. The chief apparent difficulty in the line which he recommended was the elevated district of country which was recorded to exist between the Burhampooter and the Yang-tse. No exact information, however, had been published relative to this region, for no European had crossed it; and he concluded his paper by sketching out a plan of exploration which he considered ought to be at once commenced, and which might be carried on by parties ascending the Irrawaddy, the Burhampooter, the Salween, and the Yang-tse in steamers, and then examining the intermediate tracts.

The paper will be published entire in the 'Journal,' vol. xxxvii.

The PRESIDENT said that the project suggested in this paper reminded him of the vast undertaking of Peter the Great, when he devised the grand plan of uniting the rivers of Russia by means of canals. There was a great difference, however, in the nature of the two countries. In Russia the river basins were separated from each other only by districts of small elevation, while the region between the Yangtse-Kiang and the Burhampooter was apparently traversed by almost impassable mountains. The question was truly geographical; and as such well fitted for discussion by this Society. Some years ago a paper of a similar nature was read before the Society by Captain Sprye, who suggested a route much further to the south-east, from Burmah to the western provinces of China.

General G. BALFOUR said the question discussed in the paper was one of great geographical and commercial importance. Having served for many years in China, he had an opportunity of ascertaining the fact that there was not a province in that country more celebrated for its resources than the province of Se-chuen, with which Sir Arthur Cotton's line would connect our Indian possessions. Se-chuen was 1200 miles from the sea-coast, and hence, if a direct internal communication between that province and India could be established, it would be an immense advantage. Dr. Gutzlaf often insisted on the importance of opening a route between India and China, and he pointed out the line from Assam to Se-chuen as the most desirable. The information we had of the nearest approach to Se-chuen was derived from Captain Wilcox, and was now forty years old. The distance between the two extremities of the route between Assam and China was not more than 150 miles, and the barrier separating the two countries might yet be overcome. The project for opening such a communication was one highly deserving the encouragement of this Society. Se-chuen possessed mineral wealth of great extent. Its inhabitants were a hardy, brave race, and it was very fairly peopled, having more than 200 persons to the square mile. He saw no reason why we should not encourage explorations to discover a practicable route over the mountains which lay between the valley of the Burhampooter and that of the Yangtse-Kiang.

Dr. McCOSH was pleased to find so distinguished an officer as Sir Arthur Cotton lending his engineering talents to the question of opening a direct communication from Assam into China. Thirty years ago, in his 'Topo-

graphy of Assam,' he (Dr. McCosh) brought it to the notice of the Government of India; six years ago he read a paper on the same subject before this Society; but nothing had yet been done. He was in Assam when tea was just discovered, and foresaw the advantages of such a communication. Had a road practicable for beasts of burden been constructed thirty years ago, the ruin which has lately fallen upon the tea-plantations of Assam might have been averted. The readiest means of restoring them to prosperity was by establishing ready access to Chinese labourers from China. But he could not give his approbation to the route proposed by Sir Arthur Cotton due east from Sudiya into Se-chuen. This route had long been known as the Mishmee Pass. In 1826 Capt. Wilcox explored it as far as Dea-ling, and in 1844 Capt. Rowlatt explored it as far as Too-pang. In 1855, two missionaries, Krick and Mowey, attempted to cross it, but they were both murdered by the Mishmees. When Capt. Rowlatt was at Too-pang he met a party of Chinese traders, who were prevented by a fall of snow from proceeding, and had to remain there till next summer. The country is full of dangers; in fact, the main chain of the Himalaya here takes a bend to the south, and a great part of the year the passes are closed by snow. The rivers are tremendous torrents, passable only in baskets suspended from a rope stretching from side to side, the baskets being pulled over by ferry-men. In fact, the great rivers of Martaban, Siam, and Cambodia must be crossed, and, for anything we knew to the contrary, the mysterious river of Lah-sah. Moreover, the line is too far north for commerce. Bhamo, on the Irrawaddy, is the great entrepot of China trade, and any route must necessarily pass through it. A very good route could be constructed from Jorhath, in Upper Assam, over the Pat Koye Range to Mogaung and on to Bhamo. By this route the Burmese army invaded Assam. But the hill tribes on the route—the Singphos and Mat-tucks—would be very difficult to control. The route *via* Dacca, Sylhet, Banskundie, across Munnipoor, to the Ningtee or Kyen-duen River, thence across Upper Burmah to Bhamo, and thence on to Yunnan, would be a much better speaker to have the advantage over every other route. A police force already exists, and it is necessary only to widen it and establish security by a police. A railway is now under construction from Calcutta to Dacca, and it might easily be carried on to Banskundie. Banskundie to Monfoo on the Ningtee River is distant 200 miles, and the country generally easy. From Monfoo to Bhamo the distance is about 150 miles. At present there is much intercourse between Munnipoor and Ava. He had no hesitation in pronouncing that line infinitely preferable to all others.\*

Sir Arthur Cotton said that no project was better calculated to interest this Society or the Government than that which had been brought forward by the author of the paper. The points selected for the connection of the Burhampooter and the Yangtse-Kiang were certainly those which would strike any one, on looking at the map, as the two points between which the line of communication should be made; but he was inclined to agree with the remarks of Dr. McCosh, in which he stated that a more southern line would be found the more practicable. His (Sir Arthur Phayre's) reason for this opinion was, that although there had been no survey and no reconnoitre between those two points by any European, still there existed a caravan-road from the province of Yunnan to the town of Bhamo, which Dr. McCosh mentioned. *Primâ facie*, therefore, that would seem to be the most probable route for an eventual communication between the rivers of the two countries.

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\* [Since the meeting I have been favoured by Sir Macdonald Stephenson with a copy of his magnificent map of railways projected upon the Indo-Chinese frontiers, and find he has selected the identical line I proposed in 1860. Already this line is finished as far as Khooshtea, the first link between Calcutta and Canton.—Dr. McC.]

Mr. CRAWFURD said he heartily wished he could agree with the project of Sir Arthur Cotton, for he should be happy to coincide with a gentleman who had, to his (Mr. Crawford's) certain knowledge, rendered more substantial service to India than any other man he could name. It would be very desirable to establish a rapid water-communication between the 200 millions of British subjects in India and the 400 millions of Chinese. The line of communication proposed between the Burhampooter and the Yangtse-Kiang by Sir Arthur Cotton, was only 250 miles in length; but it lay through the worst country in the whole world,—a congeries of mountains, divided by very narrow valleys, which would hardly allow the sun to penetrate them, and covered with a deep jungle of forests abounding in leeches, so that a traveller could not pass through them without losing nearly half the blood in his body. The country was also inhabited by one of the most savage and war-like tribes in all the east. But, supposing the difficulties to be surmounted, the western province of China, to which the route conducted, was almost the worst and most unproductive province of that empire. The same objection might be urged against the route recommended by Captain Sprye, which terminated in the province of Yunan. Se-chuen was equal in extent to the United Kingdom, and contained a population of about 133 inhabitants to the square mile. Yunan was equal to twice the size of Great Britain, and its population was 55 inhabitants to the mile. It was not from such countries as those that we were to expect a profitable trade. Our real intercourse must be with the eastern provinces of China. The staple product of Se-chuen was rhubarb, and a little of that article would go a long way. The quantity imported into this country was 130,000 lbs. weight, of the value of 56,000*l*. That would afford no great trade, even supposing all our rhubarb came from Se-chuen. The Yangtse-Kiang was navigable for about 960 miles, and the distance not navigable was about 600 miles further. Du Halde stated that the territory of Ching-foo, the capital of Se-chuen, was the only level spot in the whole province. He believed that the route pointed out in the paper was impracticable and delusive.

Mr. G. CAMPBELL said that they must all feel that the very sanguine expectations expressed by Sir Arthur Cotton would not be realized in their own day or in that of their children; but, on the other hand, a direct line of communication for social intercourse and light traffic between the two countries of India and China might be established even in our own day. He regarded the immigration of Chinese into India as the most important point which had been mooted this evening. He believed that, if a route could be opened to Assam, that province would become one of the most productive in the world. It possessed tea-fields, and also produced coal. The Burmese route would probably be the easiest physically, but there were very great political difficulties, and the distance was much greater. Every effort should therefore be made to open the direct route by a mountain road similar to the Hindostan and Thibet road. If the Chinese Government could be induced to agree with the British Government for the establishment of such a route, enormous advantages might be obtained.

Mr. SAUNDERS said that the immediate proposition of Sir Arthur Cotton was not so impracticable as might be supposed from some of the remarks which had been made. The immediate proposition was to ascertain what was the nature of the difficulties which would have to be overcome in the establishment of a line of communication. The only generalization arrived at relating to the inhabitants of the district through which Sir Arthur Cotton's proposed route lay was that they were of the Shan race; and what we knew of that race farther south was highly favourable to them. It might, therefore, be expected that they would not present any formidable difficulties if they were approached cautiously. The evidence we possessed with regard to the mountains favoured the belief that they were considerably depressed below the

elevated mass which encircled Thibet. There was at the present time a great highway traversed by mules between Bhamo and the Yang-tse. There was some reason to believe that an English establishment existed at Bhamo in former days. He believed that the Chinese authorities would not oppose the removal of restrictions to intercourse across the Indian frontier, if it were urged by our own Government.

Sir ARTHUR COTTON said that it would be clearly seen that the principal objections which had been brought against his route were only *supposed* to exist. His proposition was to go and see whether they did exist. He hoped that persons would not be stopped by imaginary difficulties. It was a mistake to state that Se-chuen was a miserable province. On the contrary, it was a magnificent country, with a population of ten or twenty millions. If we could once enter the Yangtse-Kiang we should have all China at our feet. It conducted us into the very heart of the empire. He only proposed at present that we should explore the country between the Yang-tse and the Burham-pooter.

The PRESIDENT congratulated the Society on the discussion of this evening. Nearly all who had spoken acknowledged the importance of establishing, if practicable, a communication as had been indicated by the author of the paper, whilst all agreed in thinking that the suggestion for an exploration of the country between the great empires of India and China was worthy of encouragement.

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3. *Notes of a Journey to the North-west of Pekin.* By JONES LAMPREY, Esq., M.D., F.R.G.S.

THE northern provinces of China were not open to English travellers until the autumn after signing the Treaty of Peace in 1860, and the restrictions were removed gradually; permission to make excursions into Manchuria, Shansi, and Shantung, not being granted before the spring of 1862. The facilities for travelling are abundant; the country is everywhere traversed by tolerable roads, there are excellent Tartar ponies, an abundance of mule-carts, and innumerable inns, although these, in remote places, give sometimes very inferior accommodation. Dr. Lamprey left Pekin on his journey to investigate the productions, methods of tillage, manufactures and customs of the country to the westward, on the 23rd October, 1861. In many of the towns and villages passed through, he was the first European that had been seen by the inhabitants. But he was generally treated with civility, and opportunities were afforded him of pursuing his investigations. Throughout the rural districts a small line of unploughed land, about a foot wide, was the only boundary between the properties of neighbours, so that the absence of conspicuous boundary lines was a peculiar feature of the landscape in the level country which extends from Pekin to the Shi-Shan or Western Mountains. The road sometimes led through thick plantations of pear, apple, peach, poplar, and other large timber trees, all planted in regular rows; the villages were surrounded each by a mud wall and ditch, and some of the towns had well-built crenelated

walls. On the 28th he crossed the Lu-Lee-Ho River, flowing from the north, and on the 1st of November arrived at the famous Buddhist temple of Shan-Fong-Shan in the mountains, which he described in his paper with great detail. In the neighbourhood of the temple he was entertained in the most hospitable manner by a Chinese gentleman who owned landed property in the neighbourhood, and who had introduced himself to the traveller with open-hearted frankness. Under the guidance of his host he made several excursions and investigated the marble quarries and farming operations of the vicinity; cotton and tobacco were here cultivated. The marble quarried here was conveyed to Peking; and Dr. Lamprey saw several carts starting on their journey, surmounted by the yellow flag, which showed they were in the Imperial service. On reaching the *Mausolea* of the Emperors of the Tsing dynasty the mandarin in command refused him permission to visit the tombs, but allowed him to ascend a hill which overlooked them, from which he distinguished the six great tombs of Shunchi, Kanghi (17th century), Yung-Ching, Kien-Lung, and Kia-King (18th century), and Tan-Kwang, who ascended the throne in 1821. On the 6th November the traveller reached Powting-Foo, a clean and flourishing city, where he stayed two days. On the following days the weather became severely cold, and violent dust-storms overtook the party on the high road; on the 9th the journey terminated by their arrival at Tien-tsin.

The paper will be published at greater length in the 'Journal,' vol. xxxvii.

Besides the suite of the Duc de Leuchtenberg, including the celebrated mineralogist General Kokscharof, formerly the associate of Sir Roderick Murchison in his exploration of Russia, and the distinguished French savant M. de Cloizeaux, the meeting was attended by a number of young Japanese gentlemen, who are under the tuition of the Rev. W. V. Lloyd.

In a short address the President congratulated the Society on the

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## ADDITIONAL NOTICES.

(Printed by order of Council.)

1. *Volcanic Eruption in the Azores.*

(Communicated by the BOARD of TRADE.)

A VOLCANIC eruption of short duration occurred in the month of June last, in the bed of the sea, near the island of Terceira in the Azores. Information of it was communicated to our Vice-Consul at Fayal, by J. Read, Esq., H.B.M. Vice-Consul at Terceira, in a despatch dated the 6th of June. He said, "I am induced to acquaint you that a submarine explosion took place on the 2nd instant, at about six or seven miles to the north-west of Ponta da Serreta, in the Azores, under the impression that the commander of any of Her Majesty's ships touching at Fayal may be induced to visit the locality for the purpose of ascertaining the situation and extent of this new danger. Yesterday the Intendent of Marine here proceeded in a boat to the spot, but could not approach as near as could be wished, on account of the emission of steam and tremendous stones that at intervals were hurled into the air. It is calculated that an islet or shoal is there formed, extending, as well as could be judged, about three miles in an east and west direction. It is distant about three miles from the Serreta rocks, as set down in Captain Vidal's chart of the island."

Information was subsequently received by our Vice-Consul at Fayal to the effect that the eruption still continued on the 6th of June, and that an islet or shoal was formed to the extent of  $2\frac{1}{2}$  miles east and west, distant 9 miles from Serreta Point, bearing north-west by compass; lat.  $38^{\circ} 52' N.$  and long.  $27^{\circ} 33' W.$  The Intendent of Marine of the Azores has since reported that on the 17th of the month the volcano was completely extinct, that all vestiges had disappeared, and no soundings could be found on the spot at a depth of 320 metres.

2. *Notes on the Yang-tse-kiang, together with Corrections of the existing Charts.* By J. MINETT HOCKLY, R.N., Harbour Master, Shanghai.

[Extracts.]

THE nature of the Yang-tse below Hankow is familiar to all members of the royal and mercantile marine; but that important portion which lies far beyond the limits hitherto thrown open to foreigners, has obtained comparatively little attention. So long as the rebellion was in existence, attempts to explore the Yang-tse, or the districts on its shore, were a matter of considerable risk; and since the capture of Nanking and the consequent extinction of the Taiping insurrection, neither the Chinese Government officials nor the representatives of foreign powers have offered any encouragement to adventurous Europeans who might otherwise be tempted to encounter the dangers and inconveniences incident to a voyage of discovery. At the same time it is only fair to the generally inoffensive natives of China to state that, in the opinion of those whose knowledge of Chinese character renders them most competent to give an opinion on the matter, the perils of such a journey are largely over-estimated. A serious error was made in despatching so formid-



able a party to accompany Captain Blakiston's expedition in 1861; for, although the list of "four Europeans, four Sikhs, and four Chinese," appears at first sight sufficiently moderate, one European or at least two, together with one or two natives, would have excited no suspicions, and the expedition would in all probability have succeeded in its original design, of penetrating into Thibet and thence to North-Western India, *viâ* the Himalayas. The Chinese are naturally and essentially jealous and suspicious, and this fact should be borne in mind whenever another attempt shall be made to explore the portion of the Yang-tse left unvisited by Captain Blakiston. As it is, we owe him a debt of gratitude for the information he has succeeded in collecting with respect to the geography of at least 900 miles of the river, which, but for him, would have remained unknown to the present day.

It is difficult to obtain a correct estimate of the actual length of the Yang-tse-kiang. Its source is in about  $100^{\circ}$  E. long., and it falls into the Yellow Sea in  $121^{\circ} 50'$  E. Its direction, therefore, from west to east corresponds to at least  $20^{\circ}$ , but, as throughout its entire course it persistently winds and often doubles upon itself, the estimate of a total length of 2000 miles may be regarded as rather within than beyond the mark. This vast extent is sufficient to account for the reverence wherewith the Chinese regard the Yang-tse. They call it, in ordinary discourse, *Ta Kiang*, or "Great River," *Chang Kiang*, or "Long River," and still more frequently *Kiang* or "The River." A favourite proverbial saying is, "As the ocean is boundless, so is the Yang-tse bottomless," and the greatness of the river enters in various ways into the everyday colloquial language. The name Yang-tse-kiang has received various interpretations, but that to which most credit is now attached by Chinese scholars is, "The River of the Kingdom of Yang," in allusion to an ancient division of China, whereof the river was the southern boundary.

The river has been explored as far as Ping-shan (long.  $104^{\circ}$  E., lat.  $28^{\circ} 30'$  N.), but beyond this point, and as far as the confluence of the Wu-liang River (long.  $100^{\circ} 30'$  E., lat.  $22^{\circ}$  N.), which joins the Yang-tse on the left bank, the stream is navigable. The upper waters are dangerous, in consequence of the rocky nature of the bottom, and of the mountainous regions in the vicinity, which give rise to constantly recurring torrents. The Wu-liang, however, falls into the Yang-tse at a point nearly upon the boundary of the productive districts; and therefore, for commercial purposes, it would be useless to attempt navigation any higher than the city of Li-kiang, which stands at the junction of the two rivers.

If we draw up a list of the most important articles of export, we shall find that the Yang-tse districts almost exclusively supply foreign markets with those articles of luxury and utility for which we are indebted to China. Thus, silk finds its way to Shanghai through the Wusung River, an important tributary of the Yang-tse; and the rarer description of yellow silk is produced in Szuchuan alone, and can find an exit only by the Long River. The most serviceable descriptions of black and green teas are grown upon the slopes of An-hui, Hupeh, and Hunan; the yellow cotton, manufactured into the fabric known as Nankeen, grows within sight of Yang-tse in the immediate neighbourhood of the celebrated city of Nanking. The coal-fields of Hunan are inexhaustible, as also are the alum-pits of the same province and of An-hui. Copper and iron mines abound in Szuchuan, Yunan, and Hupeh, and although the traffic in metals is at present extremely limited, a time must eventually come when this branch of commerce will be thrown open to foreign enterprise. China ware (Kiangsi), orpiment (Yunan), Indian ink (An-hui), musk (Thibet, Yunan, and Szuchuan), salt (Szuchuan), tobacco (Hupeh), paper (Hupeh), timber (Szuchuan and Kiangsi), are conveyed from their place of production solely by the Yang-tse, which hence will be seen to bear no inconsiderable share in furthering the commerce of the whole world.

The open ports on the Yang-tse are the following:—

*Shanghai*, the largest and most important centre of trade in the valley of the Yang-tse. It deserves especial notice on account of its having been the first port to which the system of a foreign inspectorate of customs was applied. During the rebel occupation in 1853-55, it was arranged between the English, French, and American consular representatives and the Imperial authorities, that, pending the restoration of the rightful authorities, the duties on foreign imports and exports should be collected by foreign commissioners, nominated by the consuls under the approbation of the Chinese. So acceptable did this arrangement prove to all parties concerned, that, upon the opening of other places, the system at first adopted as a merely temporary measure to meet a merely temporary emergency was extended, and is now in full operation at all the treaty ports. In 1861 the trade of Shanghai received an additional impulse in consequence of the opening of Chin-kiang, Kiu-kiang, and Hankow. Since then the amount of trade may be approximately estimated from the subjoined statement of revenue collected during each subsequent year:—

*Shanghai*—Revenue accruing from duties on imports, exports, opium, and tonnage:—

| Year. | £.        | Year. | £.      |
|-------|-----------|-------|---------|
| 1861  | 390,042   | 1864  | 706,648 |
| 1862  | 1,098,748 | 1865  | 687,404 |
| 1863  | 1,099,240 |       |         |

Total for five years .. £3,982,082

At Shanghai, as at all the ports in China open to foreign flags, the lion's share of the trade, both in imports and exports, falls to Great Britain. Thus, in 1865, the total trade of the ports with *foreign* countries amounted to 39,738,983*l.*, which was thus distributed:—

|                                                            | £.         |
|------------------------------------------------------------|------------|
| Great Britain and British Possessions .. .. .              | 34,167,531 |
| United States of America .. .. .                           | 2,010,015  |
| France and the Continental States .. .. .                  | 2,019,959  |
| Japan .. .. .                                              | 1,541,478  |
|                                                            | <hr/>      |
|                                                            | 39,738,983 |
| Add to which, for trade with other <i>Chinese</i> ports .. | 49,435,556 |

Total trade of the open ports for 1865 .. .. 89,174,539

*Chin-kiang* stands on the right bank of the Yang-tse, nearly opposite the affluence of the Yun-ho, or Grand Canal, which connects the Yangtse with the Yellow River and the Peiho, and thus would appear naturally to direct the trade of the northern provinces into the Chin-kiang market. In the year 1842, when this city was captured by the English expeditionary force, it was a place of very considerable importance; but it has since then been frequently made the bone of contention between Imperialists and rebels, by whom its suburbs have been destroyed and its trade completely annihilated. Moreover, the Yellow River has of late years received no attention at the hands of the Government, and consequently the mouths of the Grand Canal opening on that river have silted up, thus interrupting the communication between the northern producing districts and the Yang-tse. Foreign merchants who have settled at Chin-kiang have been grievously disappointed in their expectations of a remunerative trade, more especially as the absence of any safe anchorage-ground has hitherto prevented this place from becoming the outlet for the produce even of the surrounding districts. This drawback is at present in process of removal by the construction of artificial basins, where, it is hoped, junks laden with tea and cotton from the neighbourhood of Nanking will lie. The native governor of the province has undertaken these works, and up to a recent date they were progressing satisfactorily. In the absence of some pro-

vision of the kind, Chin-kiang could never become valuable as a centre of foreign trade, as the rapid current of the river and otherwise bad anchorage throw very great difficulties in the way of lading, discharging, or transshipping cargo.

*Kiu-kiang* is the outlet for the trade of the Poyang lake, which opens into the Yang-tse a little below the city. A considerable amount of the trade in black and green tea passes through this port, the value of that commodity shipped having been, in 1863, 2,126,286*l.*; in 1864, 1,065,644*l.*; and in 1865, 1,902,607*l.*

*Hankow* is the farthest limit of foreign trade in the interior of China. It lies at the mouth of the river Han, a tributary of the Yangtse from the north, and forms the depôt of the trade of the Hupeh province. Hankow is, properly speaking, a suburb of the prefectural city of Hanyang, which lies on the opposite side of the river Han; but from time immemorial it seems to have been celebrated as a place of great trade, the scene of a continual fair. This is not surprising, as it lies in the immediate neighbourhood of the central city of China—Wuchang, whither traders from all the richest producing districts in the empire continually flock, and where there is always a congregation of merchants not only from every corner of China, but from Thibet and the provinces of Independent Tartary. Of so vast importance is its possession considered, that it changed hands no less than four times during the period 1853 to 1860, when the Taiping rebels held a somewhat divided sway over the adjacent provinces. The staple import of Hankow is tea; but, as it is the meeting-place of traders from all parts of the interior, every description of import finds a ready market.

The Upper Yang-tse alters so rapidly in all its essential features that a chart, unless constantly under correction, rapidly becomes useless. This is the strongest argument in favour of a regular and organised system of surveying, in which the small war vessels of the European Powers might advantageously co-operate with the Chinese. It is to be hoped will sooner or later result to the conservancy of the river. It will, however, first be necessary to induce the native authorities either to place a steamer altogether at the disposal of the officer appointed to the charge of the navigable portion of the Yang-tse, or to afford him such facilities for the discharge of his duties as may enable him to make at least quarterly corrections in the charts. The difficulties of obtaining such a concession have been over-rated, for the Chinese as a rule are open to persuasion, and require but to be convinced of the necessity of a measure, or of the determination of Western Powers to enforce it. To the Consular representatives, therefore, we must look for aid in this matter, as suggestions coming from foreigners in native employ are likely to be over-ruled whenever such suggestions imply the necessity for increased outlay.

The startling alterations noted below furnish the most unanswerable proof of the necessity for such a succession of surveys as is recommended, for although all the errors at present noticeable in the charts are rectified, these rectifications will no longer be safe guides after the lapse of six months or a year.

*Lower Yangtse.—Saddle Islands to Wrecks of 'Hellasport,' and 'Ocean Mail.'*—This portion of the river was surveyed in 1864 by Mr. E. Wilds, Master Commanding Her Britannic Majesty's surveying ship *Swallow*; and the chart constructed on that basis is still sufficiently correct. It is to be wished that Mr. Wild's survey had been completed as far as Wusung, but other duties, and the approach of the hot season, prevented the fulfilment of the original design, and deprived the mercantile community in China of what would have proved a most valuable boon.

*Upper Yangtse.—Wusung to Langshan Crossing.*—Of this there is a manuscript chart constructed by the officers of Her Majesty's ships *Acteon* and *Dove*, during April 1859, and March and April 1861. As far as Centaur Bank

there is no perceptible alteration to be noted, but from this point the indications of the chart are less worthy of confidence. The north-east end of this shoal is rapidly disappearing, while a corresponding increase is noticeable at the north-west end. Passing on to Plover Point we find little or no alteration, but the growth of the north bank towards the southward has modified the condition of the river opposite Southey Knoll, so that the North Bank Buoy, placed close to the edge of the North Bank, now lies w.x.  $\frac{1}{2}$  n. from Plover Point, at a spot where at the time of the construction of the manuscript chart there was 8 fathoms, and which lay exactly in the fairway of vessels going up and down the river.

In the manuscript chart 8 to 9 fathoms are shown to the southward of Hunter and Southey knolls. Now, however, the knolls having shifted close to the south shore, deep water covers their former position, while the southward of that position has been transformed into a network of shoals.

About 4 miles higher up, in the position marked "Shoal-water with several dry patches," in May, 1866, 4 to 5 fathoms were found; the same depth being found close to the north shore under the town of Langshan, which in the chart is represented as a continuation of the shoals just mentioned.

*Langshan to Chin-Kiang.*—Reverting to the chart of 1842, about 11 miles above the former position of the North Tree, which may now be recognised by a broad creek 4 miles above Langshan Pagoda, we arrive at Couper Bank, a growing shoal, dry at low water, outside Green Island. Abreast of this, and on the south bank of the channel, the disconnected shoals laid down in the chart have been replaced by a line of islands with deep water close to. From the western extremity of these islands the course is w.s.w. for  $4\frac{1}{2}$  miles, until arrival between two mud-banks recently formed on either side of the channel upon the edges of the shoal marked in the chart.

*Starling Island.*—Immediately abreast of Starling Island the shoals on the north side have disappeared, and there are now from 7 to 8 fathoms, where, in 1842, there were banks dry at low water.

Opposite Starling Island, to the northward and westward, the shoal marked has become an island, now known as Fishbourne Island, and the channel between it and Starling Island having become impassable, it is probable that before long the two will unite. Close to the north shore, and abreast of the northern extremity of Fishbourne Island, the shoals have washed away, and there are now 6 fathoms immediately under the bank.

*Shayaou River.*—*Bouncer, or Pottinger, Island.*—This cut-off is now completely closed.

The river is here laid down incorrectly, the course steered to pass to the eastward cutting off a large segment at the south-eastern extremity of the island as laid down in the chart. The channel, as indicated, is closed by a mud-bank at the northern extremity of Pottinger Island, but to the westward of the island there is a second channel carrying 8 fathoms throughout. To this there is a good leading mark in the shape of a large tree on the north bank, opposite the northern extremity of the channel. Close by this tree, on the beach, lies the wreck of the steamer *Surprise*.

Opposite the Hsien-yi-mew Creek, on the south shore, the bank has grown to a very considerable extent, seriously narrowing the channel, and thus compelling vessels to keep under the north shore where the water continues deep.

The same remark applies to that portion opposite the Chang-seng Island, where the south bank has in like manner advanced into the stream.

Immediately above this is the Seausha Island, formerly 3 miles in length, but now disappearing so rapidly that in all probability within a year no trace of it will remain.

*Chin-Kiang to Nanking.*—Immediately above the foreign concession at Chin-Kiang-fu, upon the south bank, is a canal, or, more correctly, an enormous

dock, recently dug by order of Li-Hung-Chang, Acting-Governor-General of the two Kiang provinces. The design of this step was to draw the native traders from the left to the right bank, which latter had been deserted at the time of the ... had not regained its former prosperity after the extinction ... A proclamation has been issued ordering native vessels, salt only excepted, to anchor within this dock, or on the southern side of the river, while the merchants have received corresponding instructions to return to their old haunts in the city and suburbs. Much discontent has been caused by this regulation, and various efforts have been made to obtain a modification of the more important of its requirements. Hitherto, however, although some individuals have succeeded in evading it, it has nominally remained in full force, and there appears to be no probability of its being repealed, at least during the present Governor-General's term of office.

The bank on the north shore, abreast of the eastern extremity of Pih-sin-chau, has grown to a very considerable extent, and narrowed the entrance to the north channel. During the winter months the least water in this channel is 12 feet, and in consequence the south channel is used by all steamers of large draught; native boats, however, frequenting the northern cut-off at all seasons of the year. The bank to the southward and westward of Pih-sin-chau has extended as far as the 10-fathom sounding in the chart of 1842. Between the western extremity of Pih-sin-chau and the entrance of Eching Creek, a semi-elliptical shoal has formed, extending at its widest part to the 6-fathom sounding. This has also had a material effect upon the channel to the north of the island.

Abreast of the hills, 7 miles above Eching, and almost exactly in mid-channel, is a rocky ledge not marked in the chart, but lying longitudinally between the 26 and 12-fathoms.

Proceeding up the river to the great ... Island, the water has deepened considerably under the north bank, while the island itself has grown out upon its northern and north-eastern shores. The bight abreast of Ping-shan Pagoda has filled up, and the edge of the shoal now lies along the 3-fathom line as laid down in the chart. It is to be noted that the cut-off known as Nanking Creek, has, by a recent regulation, been closed to foreign vessels, and is now used only by native junks and steamers flying Chinese flags.

*Nanking to Wu-Hu.*—We now take the chart of 1858, constructed by Commander Ward and the officers of the *Acton* and *Dove*. Abreast of the San-shan, the left bank has shoaled to nearly mid channel, but immediately above this place the bank has cut away, and deep water is found close in. Off the three islands placed on the right bank below the entrance to May Queen Channel the water has become very shallow to a point nearly half way across the river.

*Rosina Rock.*—On the left bank, at the entrance of the May Queen Channel, a rock, known as the Rosina Rock, lies at a distance of 200 feet from the bank. The May Queen Channel itself is closing rapidly, and has of late been deserted by foreign vessels. The southern extremity of the island immediately below Wade Island has extended about a mile in a s.s.w. direction, thus seriously narrowing the channel between the islands. The southern extremity of Wade Island has in like manner extended for nearly three-quarters of a mile, and the left bank, a little way above it, has shoaled for about 2 miles. Dearborne Island, abreast of Point Morton, has grown about three-quarters of a mile to the southward, and the left bank, from a point abreast of the island to the fort, is very shallow.

*Rocky Ledge.*—About a mile and a quarter below Wu-Hu, a rocky ledge has been discovered close to the right bank.

*Wu-Hu to Hen Point.*—Immediately abreast of the Wu-Hu pagoda the

water sets in strong eddies, necessitating the greatest care on the part of pilots, and the strength of the current and the intricacy of the navigation, presents very considerable difficulties and offers the strongest argument in favour of careful periodical surveys. The left bank of Wu-Hu Reach has shallowed, but the islands noted in the chart as "dry in December" have disappeared. About a mile and a half above the mouth of the river is a small rocky island under the right bank, and from this point the water along that bank has deepened. The northern and eastern sides of Haines Point have extended to mid-channel, at the expense of the opposite shore, which has been cut away and deepened to 15 fathoms. On rounding the Point the left bank will be found to have shoaled for about 400 yards; but the right bank gives deep water close to, as far as Yeh-shan. The land about Barker Island is incorrectly laid down, the shoal much further to the northward than appears on the chart. On Kieu-nien, on the shoal marked 24 fathoms, there are now 7 fathoms, and at the point abreast of the upper extremity of Barker Island the shoal marked has completely disappeared, and 3 fathoms may be found close to the bank. Of Leyn-liau, opposite Teli-Kiang, the bank has shoaled to a slight degree. From Osborn Reach to Wild Bear Reach the chart is incorrect, the southern channel curving considerably more to the northward than is laid down. In the middle of the southern channel there is an island, to the westward of which lies the course adopted by steamers. Neither the southern nor middle channels, the latter of which is known as Cosmopolite Channel, can be used except after the water has risen 12 feet. In June, 1863, the soundings in the former ranged from 3 to 7 fathoms, and in the latter from 4 to 8.

A third channel to the north of Cosmopolite Channel is that principally used, and to it we confine our attention. The mud-bank on the left shore of Osborn Reach, marked "dry in December," has extended to the southward and westward, while the land above it on the same side, in the neighbourhood of Lauwan, has washed away. On the right bank opposite the Siau-shan-miau village the land has extended a considerable distance into the stream, the channel, however, remaining unaltered. Opposite the western entrance of Cosmopolite Creek, and above a conspicuous tree growing on the left bank, a shoal of no very considerable extent has formed. We note no alterations of importance until we reach Ta-tung, opposite which, on the left bank, a shoal has formed extending to the 5-fathom sounding, as marked in the chart of 1858, while above Ta-tung, abreast of Wu-pa-kau, another shoal has grown on the spot marked "shallow." Arriving at FitzRoy Island, the direct channel is closed at the upper end, and the northern channel is now exclusively used. From the eastern end of the island a most dangerous shoal extends to a distance of nearly a mile; soundings in May, 1865, showing a depth of no more than 4 feet. As this shoal was not seen during the winter of 1865-66, when the water was at least 16 feet lower than in the month of May, we must conclude that it was suddenly formed. The shoal on the left bank, abreast of the upper extremity of FitzRoy Island, has disappeared, and at the place indicated in the chart as shoal there are now 3 fathoms. The river in the neighbourhood of Hen Point is excessively dangerous, principally from the existence of rocks lying abreast of it, and of a spit just above a low point not marked in the chart, but nearly opposite Lang-kyang-ki. In order to avoid this spit, which extends to the 7-fathom mark, vessels on arriving close to the low point mentioned above steer south-east to the opposite side of the river, where there is deep water close to.

*Hen Point to Tung-Liu.*—The junk channel to the north of Jocelyn Island may be used during the winter, the least water at that season being 15 feet. Abreast of Nean-king the bank marked in the chart as dry has not been seen of late; but I am not in a position to state whether or not it has entirely dis-

appeared. The spit off Sandy Point must be approached with much caution, as it is ~~in an easterly direction~~. To the eastward of Christmas Island ~~the spit~~ has shoaled, while the spit at the southern entrance is rapidly enlarging, an island having formed about a mile to the southward of Red Sand Bluff. From this point to about a mile above Tung-liu the western or left bank is shallow, but may be approached with safety in summer.

*Tung-liu to Split Hill.*—The bank above Tung-Liu, marked "dry in December," has extended slightly at both extremities. Immediately above it, and in a direct line with it, is a ledge of rocks, upon which the steamers *Sze-chuen* and *Express* grounded in February, 1865, at which date there were 4 feet of water over it. To clear this ledge in winter the course lies within 150 feet of the right bank; but too much caution cannot be observed, as rocks are found close in-shore about 2 miles farther up. The left bank has grown into a semi-elliptical shoal from Whan-yuen-chin to Dove Point, but the Point itself is steep. The channel to the eastward and southward of the island off Dove Point is now known as Ma-tong Cut-off, and may be used in summer, but is considered extremely unsafe. Abreast of Dove Point, on the opposite side of Bullock Reach, a bank has formed, which narrows the channel to a considerable extent; and on the western side of the Reach the sandbank has much increased, thus compelling vessels to keep the left shore well on board from Dove Point to the Little Orphan. Rounding the Reach above the Little Orphan, where in the chart 8 fathoms is marked, a spit has extended from the "low sandy shore" on the left bank; and the channel, therefore, lies close to the right shore above three conspicuous hills which come down to the water's edge. A mile above Remark Rock a wide creek opens on the right shore, leading towards the low hills marked "80 feet." About N.W. by W. from this creek, on the opposite bank, is a point, close to which the channel lies. The sandbank on the right shore has extended half-way across the river for the distance of about 6 miles, and above it the sandbank has been replaced by well-marked land. The channel to the north of the shoal, marked "dry in December," has been closed by the continuation of the shoals towards north-east and south-west from the earth bank to Point Beecher. This shoal is cleared by pursuing a course north-east and south-west from a large tree on the left bank in a conspicuous position below the shoal. The least water found in winter in the channel thus indicated is 18 feet. Off Oliphant Point an island has formed which narrows the entrance to the northern channel. In February, 1864, the depth of water on the bar in the northern channel was 12 feet, and in the southern 8 feet. Immediately above Kiu-kiang the left bank of Seymour Reach, as far as Hunter Island, and a considerable portion of the right bank have shoaled to such an extent as to reduce the width of the channel to a minimum. Arriving at Hunter Island, the southern channel is closed in winter, and on the bar in the northern channel no more than 12 feet water is found. In summer both are passable. When approaching the village of Fu-tse-kan the channel is found to have narrowed considerably by the increase of the banks on both sides.

*Split Hill to Wu-chang-hsien.*—Abreast of Havoc Rocks, in mid-channel, a rock, 3 feet above water, was noticed in February, 1865. The right bank of the river abreast of Kichau, from the hill close to the water's edge, marked "150 feet," to a point abreast of hills a mile inshore, marked 200 feet, has shoaled to an alarming extent, making the channel dangerously narrow during the winter months. The right bank below Kitau has grown to the "5-fathom" sounding, and above Lee Rock, on the left bank, the shoal has extended slightly beyond the same sounding; thus rendering the utmost care and circumspection necessary while passing both bends. From 300 to 500 feet from the left shore immediately above Why-lung-ki Hill, a very dangerous ledge of rocks, not marked on the chart, is to be found. The Pa-Ho Reach, above Collinson's Island, is full of shifting shoals, which it would be

vain to attempt to describe, as their relative positions with regard to one another and to the banks of the river change with the utmost rapidity. The sole guide, therefore, is experience, which can only be gained either at the expense of continual trips up and down, or from the observations of the captains of the steamers that constantly navigate the river between Wusung and Hankow.

*Wu-chang-hsien to Hankow.*—The channel to the westward of Gravenor Island is filling up, and must be considered unsafe. The bank above the island, marked "dry in winter," is now well-marked land. On the right bank, nearly abreast of a clump of trees a little above *San-hsing-kow*, a new channel has opened,—not, however, yet surveyed. Its *depth* is *now* by *w.* In the Lo-koh-hi Reach, of Yang-kia-chan, a shoal has extended from the left bank to the 6-fathom sounding; and immediately above this a bank has risen in mid-stream, where in the chart 6 and 7 fathoms are given. As the right bank in the neighbourhood is rocky, the channel adopted lies to the north of the new bank.

Off Lo-koh-ki, and abreast of the bluff, a ledge of rocks has been discovered, about 500 feet from the right bank; and on the opposite side the "sand-bank" has grown to the southward and eastward as far as the 4-fathom mark. After passing Pi-hu-shan, or White Tiger Hill, the right bank of the Yang-lo Reach has extended for a considerable distance; but upon passing the first hill, marked "200 feet," a course *N.  $\frac{1}{2}$  W.* for the ruined temple on the left bank escapes the danger. In Pakington Reach, between Sha-kan and the creek above it, the left bank has shoaled to a distance of about half-a-mile. Thence to Hankow the extensive shoals which have formed on the right bank render it necessary to keep the left bank well on board.

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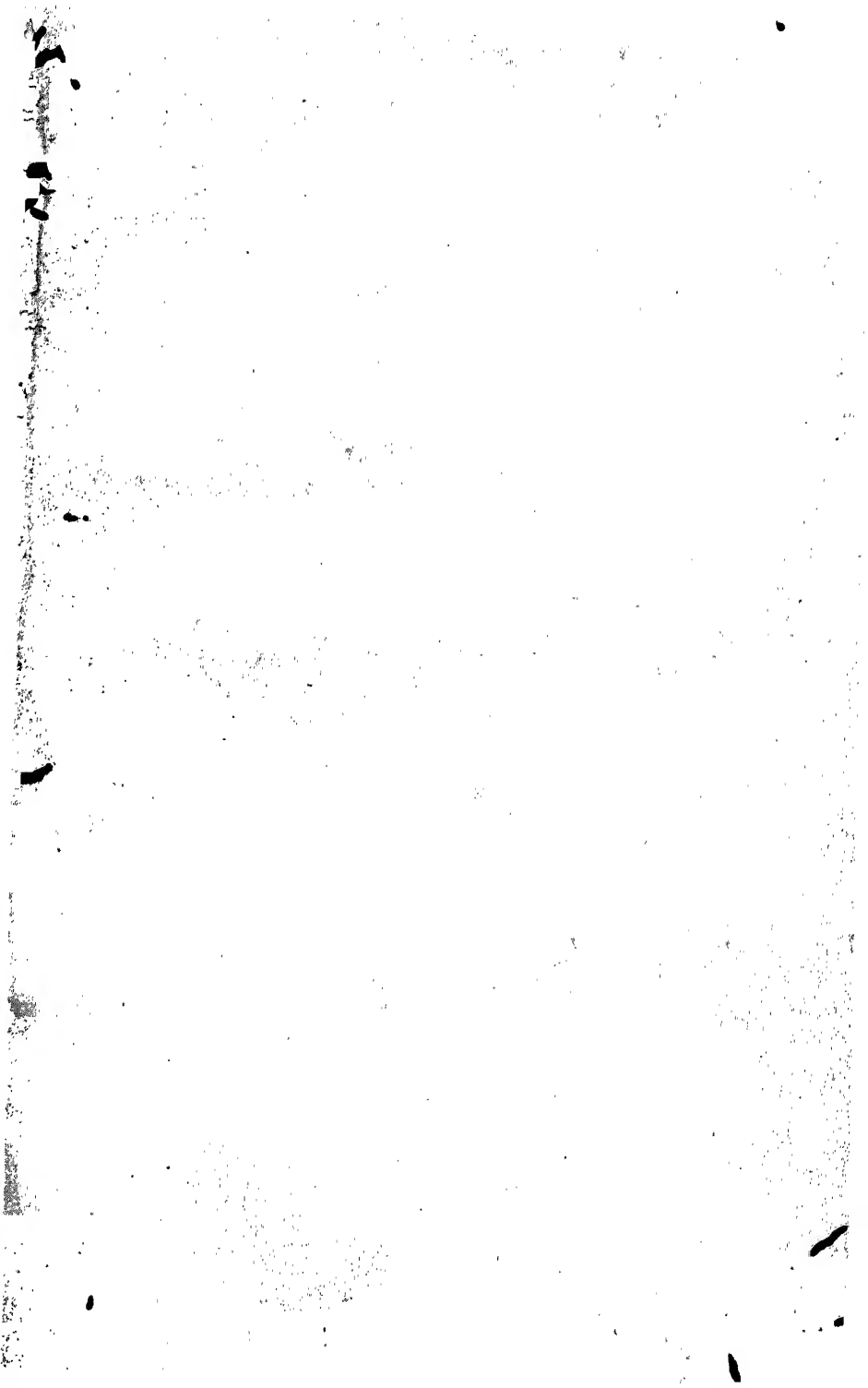
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